User Experience Design For Quantifying Social Relations Based On Smartphone Sensors

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Summary

The goal of the thesis is to create a user experience design for a mobile application, which uses social relations quantified by social and location data, in order to satisfy user needs related to maintaining, strengthening and possibly creating new relations.

In order to reach the goal the related work was investigated. This answered why social relations should be quantified, how it is done today and how it can be done based on smartphone sensors. Based on the related work an analysis of the user and user needs was done, which resulted in three use cases.

These use cases were the foundation of the features included in the first three conceptual designs. These conceptual designs were built as prototypes and tested in three iterations. The first two iterations were used to validate the problem of the thesis and the identified user needs, thereby acting as a proof of concept. Furthermore they helped to include only the necessary features needed to satisfy the user needs. The third iteration was then used to test the visual design in order to see how the users understand and interact with the interfaces. After the users' acceptance of the prototypes after the third iteration tests, a list of requirements were specified.

Then the different options for implementing the stated requirements were explored and explained in terms of advantages and risks. These laid the foundation for a front-end implementation of the application. The implementation and its features form the user experience design for quantifying social relations based on Facebook data and location data.

Resumé

Målet for denne afhandling er at lave et user experience design for en mobil applikation, som bruger sociale relationer kvantificeret af social og positions data, for at opfylde brugerbehov relateret til at vedligeholde, styrke og muligvis oprette nye relationer.

For at nå målet blev related works undersøgt. Dette besvarede hvorfor sociale relationer bør kvantificeres, hvordan det gøres i dag og hvordan det kan gøres baseret på smartphone sensorer. Baseret på related works blev bruger og brugerbehov analyseret, hvilket resulterede i tre use cases.

Disse use cases var grundlaget for de funktioner, der indgår i de tre første konceptuelle designs. Disse konceptuelle designs blev bygget som prototyper og testet i tre iterationer. De to første iterationer blev brugt til at validere projektets problemstillinger og de identificerede brugerbehov, fungerende som et proof of concept. Desuden hjalp de til kun at inkludere de funktioner, der er nødvendige for at opfylde brugernes behov. Den tredje iteration blev derefter anvendt til at teste det visuelle design med henblik på at se, hvordan brugeren forstår og interagerer med grænsefladerne. Efter brugernes accept af prototyperne fra den tredje iteration blev en liste over krav specificeret.

Derefter blev de forskellige muligheder for at implementere de specificerede krav undersøgt og forklaret i form af fordele og risici. Disse lagde grunden til en front-end implementering af applikationen. Implementationen og dens funktioner udgør user experience designet til kvantificering af sociale relationer baseret på Facebook data og positions data.

Preface

This thesis was prepared at the department of DTU Compute at the Technical University of Denmark in fulfilment of the requirements for acquiring an M.Sc. in Digital Media Engineering.

The thesis describes the user experience design process for using social relations, which are quantified based on smartphone sensors.

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Contents

Chapter 1

Introduction

In many years there has been a lot of interest in finding new ways to learn more about the human being and its social network. But there are many elements to consider, when trying to measure the social relations in a network. Today help can be found on social networking websites such as Facebook, where each user has a list of friends. These types of social networking websites roughly only has information on the friendship status in terms of being friends or not being friends. They don't give more detailed information on a relation such as the strength of the relation, their favourite places etc. Therefore the context of a person is introduced. By tracking a person's context over time one does not only know where the person was, but also what he was doing and why. This means two persons being in the same context may help to understand which situation they were in, their behaviour and how it relates them. A solution developed to track the context of a person is the SensibleDTU project. In this project smartphones are distributed to all participants, and data is then collected through each smartphone's sensors. This data is then uploaded to a SensibleDTU server, which can be accessed by the user.

The social data combined with the context data opens the way for an opportunity to quantify and visualize social relations.

1.1 Problem definition

The vision is to quantify and visualize the social relations of students at DTU. By having SensibleDTU running on each of their mobile phones, context data and social data on each of them will be recorded. The social data of all the students forms a social network. This network can be analysed using graph theory, which may help to understand the social relations. The context data together with the social data will be used to quantify the relations between the students. Analysing the user and identifying his needs related to his social relations will result in new conceptual designs for visualizing one's quantified relations. After creating prototypes from the conceptual designs and testing them for proof of concept and usability, a mobile solution will be implemented in the form of an Android application. The mobile solution will offer the user the possibility to see their dynamic social relations as they move.

This opens a possibility to get an overview of one's quantified relations and their behaviour, which will ultimately help the user to maintain or strengthen his relations, and possibly create new ones.

In this thesis it is necessary to include theory on context, social networks, network/graph theory and Lean UX.

1.2 Project delimitation

In this thesis the main focus will lie on the creation of conceptual designs and the validation of them through tests of prototypes. This means the process from identifying user needs to having the requirements for the final implementation. This implies that a solution for quantifying social relations based on smartphone sensors won't be given. However, it will be investigated whether it is possible and how it can be used.

The output of the project will be a limited implementation, where the front-end part is given priority over the back-end part. Since the back-end implementation is given lower priority, the context data used in the project will be limited to only location data. Location data is chosen, because it alone paints a good picture of the context a user is in. Furthermore Facebook data will be used as the social data source.

1.3 Report outline

The rest of the thesis is structured as follows: Chapter 2 discusses the research and analysis. This includes the related work of quantifying social relations, the needed theory to understand it and an analysis based on this research, where user needs and use cases are specified. Chapter 3 explains the iterative design process, where the prototypes, derived from the use cases, are tested for proof of concept and usability. Chapter 4 discusses the options for data collection and data visualization. Chapter 5 explains the implementation of the proposed solution. Chapter 6 evaluates the design process and discusses a possible approach to quantifying social relations. Chapter 7 concludes and answers if the problem of this thesis has been solved.

Chapter 2

Research and analysis

The first step in solving the main problem of the thesis is to research the prior work related to the thesis, and then use this to analyse the problem. This chapter consists of three sections.

The first section describes the related works of the problem given in this thesis. The first part is about the importance of quantifying and visualizing social relations and what it can be used for. This leads to a discussion of the social networking sites and how they define and quantify a social relation. Then the different earlier approaches related to quantifying and visualizing social relations based on smartphone sensors will be discussed. Exploring earlier solutions will help to illuminate which problem areas are present and which needs are still unsatisfied. Similar work already done by others can be reused and utilized if it is relevant for the thesis. Afterwards the data collection is described, where "SensibleDTU" is introduced. Then the new ideas and possibilities derived from the prior work are described, which can help to create a new solution, which quantifies and visualizes social relations.

The second section describes the theory, which the thesis is based on. In order to understand the concept of context this will be explained. Then the network/graph theory will be explored, which presents different ways of analysing a social network. These two together form the main inspiration for creating a new way to quantify and visualize social relations.

The third section describes the analysis, where the user and user needs are explained first. Then use cases, which are derived from the new ideas, are stated. These illustrate the problems, which the user might have, and how the solution should help satisfy his needs in different situations.

2.1 Related works

Why quantify and visualize social relations?

Knowing the strength of one's social relations help us to learn more about oneself and one's friends. This is both in terms of strong and weak ties.

Strong relations represent our good friends, who we trust. They are our close friends, so many times their social network greatly overlaps our own, meaning we share many common friends. They often share one's values and interests, and are generally similar to us [MSLC01]. They also affect us emotionally. When they are happy, we sometimes are too, and vice versa [FC08].

The weak relations on the other hand are the lesser known friends and acquaintances. It is usually through the weak ties that information flows. The weak ties connect us to other people and social circles, and thereby give us access to new ideas and information which isn't available in our own social circle [Gra73]. As mentioned in [Bur04]: "People with connections across structural holes have early access to diverse, often contradictory, information and interpretations, which gives them a competitive advantage in seeing and developing good ideas".

In [Bur04] salary in a company is discussed. Managers who purchased goods from external vendors had higher salaries than those who used the goods within the company. This means that people with many connections to other organizational groups were more valuable to the company. Again when firms are trying to get loans, [Uzz99] states that having weak ties to banks "optimize their bargaining power and provide access to a large pool of price and loan possibilities".

These examples show that **it is important to know the strength of one's relations meaning who your strong and weak relations are, and how they should be managed, because both types of relations can be of importance to you and help you fulfil certain needs.**

Quantify social relations on social networking sites

The social networking sites are today the main source for viewing one's friends-list. Facebook, Twitter and LinkedIn are only a small portion of the many online social networks, where one can view one's social relations. **The downside to these social networking sites are that they define a social relation to either exist or not exist and ignore the strength of the relation.** As stated in [GK09] "social media does not incorporate tie strength or its lessons. Instead, all users are the same: friend or stranger, with little or nothing in between". As the authors state in [JSB+13] "One's best friend and a long-forgotten, one-time classmate are grouped together under one ambiguous label of "friend"". Even though this is the case, several have tried to use the social media data to try measure the strength of relations.

In [JSB+13] it is demonstrated that the Facebook interactions are good for measuring the strength of a relation. The authors highlight that there isn't a difference between private messages and public wall posts as a measure of tie strength, but that the importance lies in the interaction frequency. A higher interaction frequency between two people corresponds to a stronger relation between them. This is also the case in [Gra73], where the strength of a relation again is directly inferred by how frequently persons interact with each other. In [GK09] the authors create a model, where 74 Facebook variables are used to predict tie strength. The model is used on a dataset of 2,000 Facebook friendships and it correctly classifies them as either strong or weak ties more than 85% of the times. Although the model is created from Facebook data, the variables are still general for other social media as well, which therefore also can use the same model.

In [Gra73] the authors additionally relate the creation of new relations to mutual friends: "if strong ties connect A to B and A to C, both C and B, being similar to A, are probably similar to one another, increasing the likelihood of a friendship once they have met". Again in [SAS07] the authors "consider only the presence of closed triads as evidence of "strong ties""[1], which is similar to the mutual friend statement from [Gra73].

This proves that it is possible to quantify a social relation in terms of tie strength.

[1] http://en.wikipedia.org/wiki/Triadic_closure

Quantify social relations based on smartphone sensors

Now that it has been proven that social media data can be used to quantify social relations, the question is now how to do the same with smartphone sensor data instead.

In [ZCXM09] "GeoLife2.0" is introduced, which is a personalized friend and location recommender. It helps to discover new potential friends based on the location histories of the users. The individual's visits to a region are used as his/her rating of that region. Generally the system uses the location data to predict which persons and places are of interest to the user. This system is somewhat different from the intent of this thesis, because it focuses on recommendation. The thesis focuses on how to quantify and model all relations and not only potential friends. But the idea in using location history to measure a relation can possibly be reused.

With physical location data and social network data collected, a new opportunity to learn more about the user has appeared. In several studies the physical location of users is used to learn more about the social network and the social ties of these users. In [CTH+10] the authors address the main problem of "inferring properties of the social behavior of users from their location trails". They tracked the location trails of 489 participants, which was the basis of their work. From the locations visited by the users and an analysis of the general location data the authors are closer to predict two things: 1) if there is a social tie between two people and 2) how many social ties a person has. Again the location history is used to learn more about the user's social relations and social network.

In [EPL09] self-reported data is compared with behavioural data when using this to analyse social relations. The first is when people themselves report who they are friends with and who they aren't. The other measures the relations based on mobile phone data containing observations of their behaviour. The authors find out that "the observational data are capturing information about relationships that self-reports are missing". This is due to both the possibility of people failing to report a relation and that the relations may change after they have been reported. Therefore the mobile phone data can help to get an understanding of the dynamics of social relations and how a network changes over time. This motivates the decision in this thesis on quantifying the social relations from smatphone sensor data in addition to the social information already self-reported on Facebook.

However, the social relations themselves may also cause how the people move geographically. In [CML11] the authors conclude that "humans experience a

combination of strong short range spatially and temporally periodic movement that is not impacted by the social network structure, while long-distance travel is more influenced by the social network ties". This means that the social ties of a person in some cases can help to understand the mobility of a person. It proves the connection between social ties and location behaviour which supports the idea of the thesis in using location data to quantify social relations.

It is clear that there is an advantage in using smartphone sensor data for quantifying social relations. It can capture information about relationships, which people themselves may fail to report. Furthermore it has been proven that location data can be used to quantify a social relation.

Data collection

In order to quantify social relations Facebook data and location data is needed. For this purpose SensibleDTU is introduced. SensibleDTU is an app developed by researchers and PhD-students working at Technical University of Denmark (DTU). When installed and started, the app keeps collecting data about the context of the user through the mobile phone's different sensors. The location data is collected every 10 minutes. Additionally each user of SensibleDTU is asked for their Facebook token, which gives access to information regarding their social network. This social network data can therefore also be obtained by SensibleDTU. For a user the following data types can be obtained: Friends, News feed, Profile feed, Likes, Notes, Permissions, Photo/Video tags, Photo/Video albums, Events, Groups, Check-in's and Objects with locations.

Since students at DTU already have the SensibleDTU app installed and running on their mobile phones, the database of SensibleDTU already contains collected data from each of these students. By having access to this data in the SensibleDTU database using the belonging probes API, it isn't needed to create a new app which collects Facebook data and location data for each person in a social network. With the SensibleDTU project the students themselves already form a social network where both location and social information is known over time. This data can therefore be used to analyse and model the social relations in the network of students.

New ideas and possibilities

Being able to quantify and visualize social relations has many advantages. The social networking sites today don't quantify their social relations. They don't differentiate between a best friend and an almost stranger, even though it is possible given the social media data. Therefore the possibilities for quantifying the relations using smartphone sensor data has been studied. Using SensibleDTU for data collection it is possible, and this work opens the way for new ideas and concepts. In this thesis three ideas have been derived.

The **first idea** deals with social relations and how the user can be helped in maintaining and strengthening them. This can both be stronger relations, which are weakening, which triggers the user to feel a need in restoring the relations, and it can also be weaker relations, which are of interest for the user either because they share common interests or because the weaker relations can link the user to new interesting and useful people and social groups. When a relation to a person is to be strengthened or created, the user should be helped in doing this. For example, this can be done by showing the person's favourite places so the user knows where to meet him. Another example is showing the best links to the person meaning the friends who are strongest related to both you and the person. These friends will be of help when trying to connect with the person.

The **second idea** is creating a live map-representation of the social network. By placing the user's social relations on a map according to people's physical location the user will get an overview of where the social network moves and where there is interesting activity.

The **third idea** is a graph of the social network and its relations as a whole, where the nodes represent the people in the network and the edges represent the relations between them. By having a network graph, where people are connected by an edge if they are friends and the edge's properties are set according to their relation's properties, the user cannot only get an overview of the whole network such as how it is clustered in different social groups, but also view the details on individual relations such as relation strength.

2.2 Theory

Context

According to [DA99] context can be defined as "any information that can be used to characterize the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves". An example is the location of the user. When the user is located in UK, distance is measured in miles. When located in Denmark, distance is measured in kilometres. Therefore the user's location helps to characterize the situation of the user.

Context can be divided into categories according to their type. [AM00] divide it into the "five W's":

- **Who**: Identity of the user.
- **What**: Activity of the user.
- **Where**: Location of the user.
- **When**: Time, both in terms of when the user's situation is captured and how long the user is in a situation.
- **Why**: User's reason for his activity.

Combining two or more types of context may further help to understand the situation of the user. An example is using both location and time of the user. When the user is at the university in the morning, he may be attending a lecture, but when the user is at the university in the evening, he may be at the university-bar enjoying with his friends.

Network/Graph theory

A user and his friends form together a social network with social relations connecting them. Modelling them as a network graph gives different options of quantifying them and the network they form. The study of the network structure is called **graph theory**. Graph theory allows us to draw basic network properties and use different techniques in order to learn more about the network. In order to understand the advantages of using graph theory, an introduction

will first be given. Then some chosen network properties and techniques relevant for the thesis will be introduced.

"A graph consists of a set of objects, called nodes, with certain pairs of these objects connected by links called edges" [DJ10]. A network graph example is shown in figure 2.1. When modelling a social network as a network graph, the nodes represent the people in the network and the edges represent their social relations.

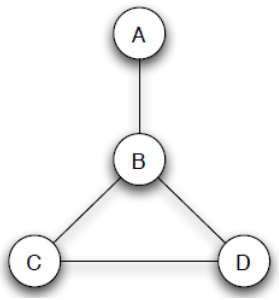


Figure 2.1: Network graph with nodes A, B, C and D.

Source: [DJ10], p.24

An interesting property of a network is the **distance** between two nodes, which represents the length of the shortest path between them. This means the smallest number of edges needed to get from one node to the other. In a social network the distance between two nodes represents the distance in friendship. Nodes with a distance 1 from a person are the person's friends, nodes with a distance 2 are the person's friends' friends and so on. An illustration of this concept is given in the following figure 2.2.

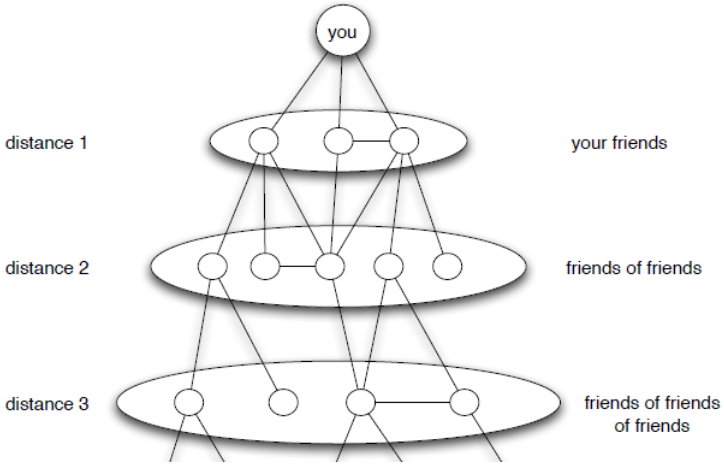


Figure 2.2: Network graph example showing distance.

Source: [DJ10], p.33

Another interesting concept in graph theory is the **components** the nodes form. According to [DJ10] a component "is a subset of the nodes such that: (i) every node in the subset has a path to every other; and (ii) the subset is not part of some larger set with the property that every node can reach every other". An example of a network graph with three components is shown in figure 2.3. In a social network containing the user and his friends every two nodes will have at least 1 path to each other, which is through the user. But removing the user from the network will divide the network into one or more components. These components represent social groups. In each social group the friends are connected to each other. Identifying these social groups and which friends they contain will help to understand the user's relation to these friends.

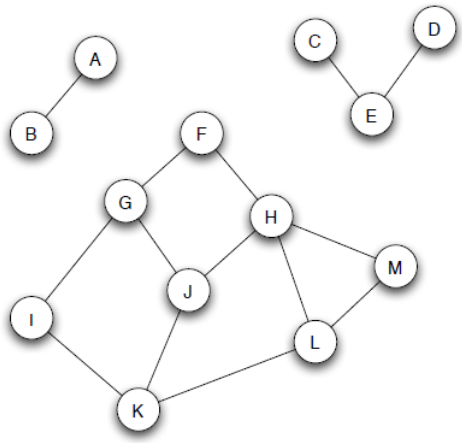


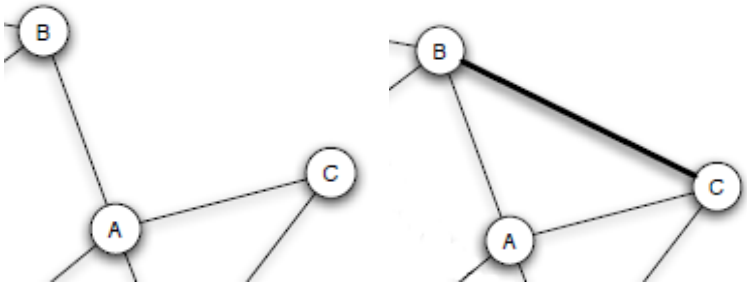
Figure 2.3: Network graph with three components: A-B, C-E and F-M.

Source: [DJ10], p.28

The last interesting concept is the principle called **Triadic Closure**. The general principle states that "if a node A has edges to nodes B and C, then the B-C edge is likely to form". This is illustrated in figure 2.4. There are three reasons for this happening [DJ10]:

- A spending time with both B and C increases the probability of B and C becoming friends.
- Since B and C each trust A, this increases the likelihood for them to trust each other.
- If A wishes for B and C to become friends, A may encourage the creation of friendship between them.

One common friend of two people increases the likelihood of their relationship changing from being acquaintances to friends. This can be interpreted as their relation becoming stronger when they have a common friend. Therefore it may also be that more common friends between two people increases the strength of their relation even further.



(a) Triadic closure before new edges

(b) Triadic closure after new edges

Figure 2.4: Triadic closure example.

Source: [DJ10], p.48

The triadic closure principle can be further extended by including the strength of the relation. This is called **Strong Triadic Closure Property** [DJ10]: "If a node A has edges to nodes B and C, then the B-C edge is especially likely to form if A's edges to B and C are both strong ties".

As mentioned before the number of common friends of two people may increase the strength of the relation between them. But the number of common friends, which they both have a strong relation with may again strengthen their own relation even further.

2.3 Analysis

User

As mentioned in Introduction the main intent with the app is to quantify a user's social relations and visualise them in a way that it helps fulfil potential user needs. The general user is one who has a social network and may have an interest in viewing, maintaining and possibly strengthening his social relations. In this project the target group is people, who have a Facebook account, since Facebook data is used as the basis for identifying ones social relations. Furthermore the project only targets smartphone users, since this is the device used to fetch the location data, which is needed for quantifying the social relations.

User needs

In order for the app to create value for the users, the users' needs must first be identified. The main needs for the users is to learn more about one's social relations and how they behave, and how this information can be used to strengthen these relations.

The main information needed is the strength of the relations. This will give the users a more detailed image of the relations in their social network apart from the self-reported friendships in Facebook. Additionally the favourite places, which the users share with the people in their social network, will further help the users to learn more about them and where they can be met in order to strengthen the relation with them. With weak relations it is not enough only to know the tie strength and the shared favourite places, but it is also important to know who of your close friends are also close friends with them. This means which common friend has a strong bond with both you and the other person. This common friend will be a great help in creating a connection between you and that person.

Apart from this the users also need to know how the relations and the whole network behave. This can be divided into two needs. The first is the need to know where the people in the network are or have been located, since this will help the user to get an image of, where there is interesting activity and where there is a potential of meeting many of the relations. The second need is to know how the people in the network form social groups. This will give an overall image of who is close related to who. From the user's perspective it will help to know through which persons he is connected to the group and which persons can help the user to maintain and potentially strengthen the relation to the whole group.

Use cases

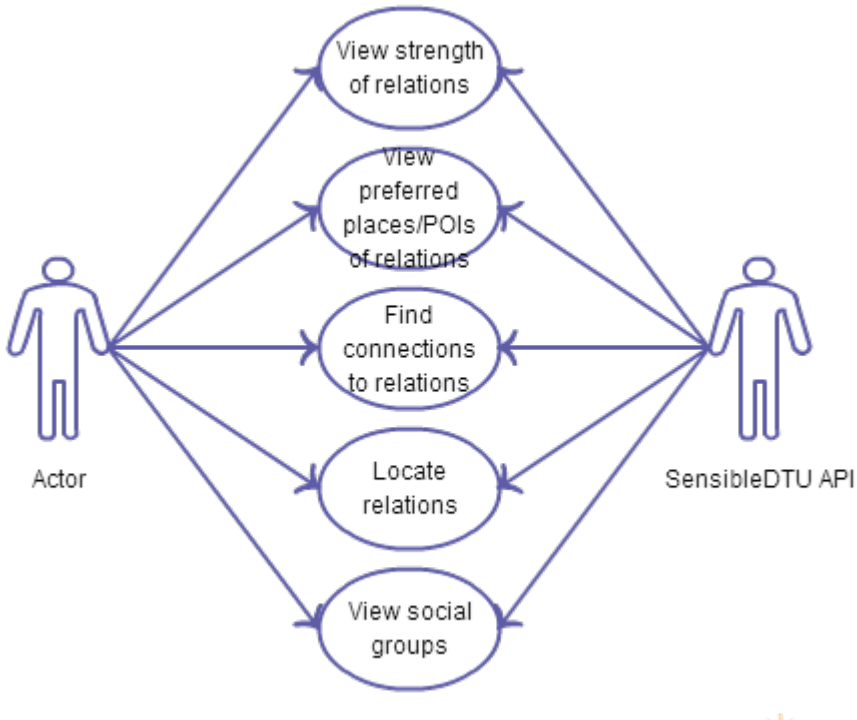


Figure 2.5: Use case diagram showing the main functions of the app derived from the user needs

Figure 2.5 shows a use case diagram, which summarizes the user needs and gives a quick overview of what the app offers to the user. The diagram shows an actor, which is the user of the app, and SensibleDTU API, which is the data provider. The use case diagram is supported by the following three use case scenarios (UCS), which illustrate how the user is supposed to use the app in different situations, where there may occur different needs for the user.

UCS: Social groups

John wants to see how his social network looks and how his relations to the different people are, so he opens the app. He navigates to the section with

social groups. The app recognizes three social groups in his network. He wants to join the first group and strengthen the ties with the members. Some of the members of the group are already friends, which he shares interests with, but some of the members are either only acquaintances or people he hasn't met. So he selects the group in the app in order to get a more detailed view about the group. This new view shows the members of the group and the preferred places of the group.

John can see that one of the top preferred places is the "PF Café" at DTU. He can see that many of the people in the group visit the café every friday from around 5pm to 7pm, which indicates that this is a popular event. Then he navigates to the "history" section under the group view in order to see how the social group has changed over time. He specifies the time interval to span from the day before to the day after the event at the café. John can see that the event has helped to form many new ties in the group and the existing ties in the group have been strengthened significantly.

John decides that he wants to attend the event. He navigates to the "connection" section under the group view. The app shows the people who form a connection between him and the group. He already has a good bond with the first person, so he sends him a message through the app describing that he would like to join him the next time he attends the event.

UCS: Strong and weak ties

John wants to see how his relations to his friends are. He opens the app. An overview of his social network containing him and his friends is shown. He can see an overall image of the strengths of his relations with his friends. He filters the view, so it only shows the weak relations. He taps on one of the relations, which shows the details of the person and the detailed strength of the relation. Here John can see how much time he has spent with the friend both in general but also at different places. Furthermore he can see how much time it is compared to the others telling him how strong the bond is between him and the friend. Additionally he can also see the number of places they go to together.

John now wants to see the extreme relations meaning the strongest and the weakest relations, so he switches to the next view. Here the top 5 strongest and top 5 weakest relations are shown. He taps on the weakest relation which opens a detailed view of the relation with the person.

John switches to the last view in order to see how the relations in his social network have changed. He first sees the change of the whole network. This

shows him the general change in relation strength between him and his friends. Furthermore he can see which new relations are created and which are broken. Then he chooses one of the links to see how the details of that single relation changes meaning the time spent together, their preferred places etc.

UCS: Map

John opens the app, which in the first view shows a map containing the people in his social network. This means his friends, his friends' friends and so on. In the view John can see where the people are geographically, and they are coloured according to the strength of their relation with John. This gives him an overall image of where his social network is located. John can see a cluster of people being near the "PF Café" at DTU meaning it is a potential place for him to go to. Since John wants to be sure that there are many people at the café, who are close friends, he filters the view according to this. He sees that there still is a big cluster near the café. He taps on the café on the map in order to see a more detailed view. Here he sees that many of his close friends are there, so he decides to go there. He then taps on the "Navigate"-button, where after the route to the café is shown on the map.

The next day John again opens the app. This time he switches to the second view in order to see which friends and acquaintances are nearby. The app shows a list of the people in his vicinity sorted by distance from him in ascending order. For each person the name, image, location and relation strength is shown. He taps on the third closest person Jake, since he is a close friend of his. In the new view details of Jake and their relation are shown. John taps on the "Show on map"-button in order to see where John is located. Then he taps the "Navigate"-button, where after the route to Jake is shown on the map.

Chapter 3

Design

3.1 Early validation

The three use cases are the first step in finding a solution to the user's needs. Before going on in the process these three ideas must be tested in order to get early feedback from users. Therefore a **Minimum Viable Product (MVP)** [GS13] will be created for each use case. Creating an MVP corresponds to creating the smallest thing, which can be used to validate one's stated hypotheses through experiments. This approach is consistent with **Tool 7: Sketch a Few Approaches** from [Kle13], which suggests that sketches of one's ideas are created and shown to actual users in order to understand whether the users "get what the product is". In this case the three MVPs are paper prototypes. These three prototypes will be used as the proposed solutions in the first iteration, which can be tested on users. The tests of the paper prototypes will help to identify problem areas, which can be corrected early in the design process. Furthermore the users can bring to light new needs, which are not yet identified. After interpreting the feedback and performing the needed changes and adjustments to the prototypes, these revised prototypes will be tested again as a second iteration. This iterative process will continue until no major changes are needed, which is consistent with **Tool 9: Test and Iterate** from [Kle13].

Prototyping tool

In order to test the three prototypes on as many users as possible over multiple iterations the paper prototypes will be implemented in Axure. Axure is a tool for creating clickable wireframes, which are easy to keep changing without having to start from scratch as with prototypes on paper. Other prototyping tools such as Balsamiq and Pop Prototyping on Paper do also exist and have their own advantages. Balsamiq gives the designer interfaces, which resembles hand drawn sketches, which is good for early low-fidelity prototypes. But the downside is that the designer will have to design the whole prototype, if he wants to keep the "sketchy" style throughout the whole prototype. Axure is preferred over Balsamiq, since the prototypes in Axure can be built on top of the screens, which have already been drawn on paper. The mobile tool Pop also has this advantage. When using Pop the designer only has to import images or take pictures himself with the mobile device, which then can be linked together as clickable wireframes. Since this tool isn't available for Android platforms, which is the only mobile platform available for prototyping and testing in this project, Axure will be chosen over Pop. In addition to the already mentioned facts, Axure also provides the possibility to publish the prototypes as html pages. This means that it can run on any browser given the url. This way the prototypes can be distributed to all the needed test users and can be tested by them without the developer having to be there. By sending the links of the prototypes together with the tasks they have to carry out, the test-users can test the prototypes on their own smartphones and report back the feedback they have on mind. Still the first priority is to oversee the test users testing the prototypes in order to get all their reactions, which possibly won't be written in their own reported feedback, and evaluate how they perform in different tasks. This will help to further evaluate the prototypes.

Format

The screens will be used as the base of the prototypes and the user interaction will be implemented using Axure. Since these are early low-fidelity prototypes, only basic tap interaction will be implemented. The idea is then that the test-users go through different tasks for each prototype and try to complete them. This will both help them to get an understanding of what value the app is supposed to bring in different situations and help to validate that the app actually meets the needs of the user.

In order to test and validate prototypes in each iteration an interview document will be written. This document will contain the whole interview guide, which

has to be used when testing the prototypes on the test-users. The document will begin with general questions about the problem which the prototypes try to tackle. This will help the test-users themselves to understand the problem. Furthermore it will help to answer if the identified needs actually are present. Subsequently tasks for each prototype will be given, which will let the test-users interact with the different features of the prototypes. The evaluation of the task completion together with the test-users' feedback will answer if the test-users understand how and why to use the app, and if there is value in the intended solution. This process is inspired by the Lean UX research approach named **Collaborative discovery in the field** [GS13].

In order to test the prototypes the test-users must be found. If the test-users have to be representatives of the target group of the app, then this must be people, who have a social network and is familiar with a smartphone. For this test having a social network doesn't have to mean having a Facebook account. But it is assumed that everyone, who owns a smartphone, also has a Facebook account and uses Facebook as the preferred social networking site.

The test-users used in the following iterations are all students at DTU. They all know how to use a smartphone and they all use Facebook. For each iteration new students are chosen as test-users. This makes it possible for the test-users to perform the tests without having any knowledge about earlier iterations, and can thereby give honest feedback both on concept and usability. The goal is to test each prototype with at least three test-users. This is inspired by the Lean UX research approach named **Continuous discovery in the lab: three users every Thursday** [GS13].

1. iteration

Figure 3.1, 3.2 and 3.3 show the main images of the paper prototypes of the three use cases. These together with the remaining images form the screens of the prototypes.

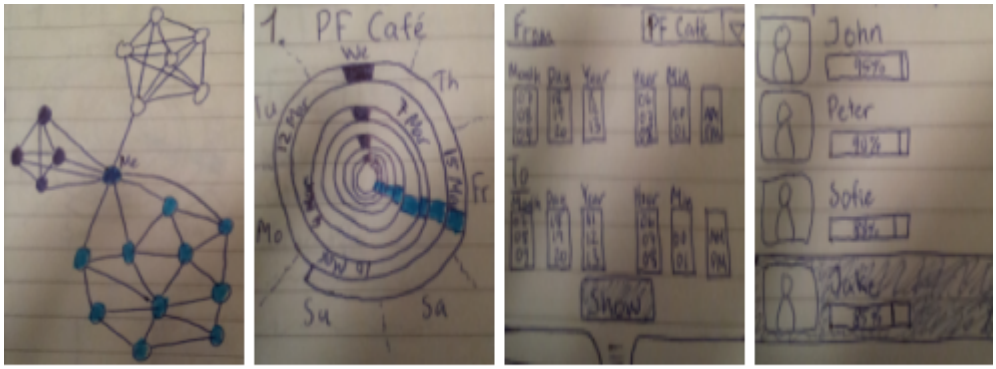


Figure 3.1: Main images of the paper prototype for the use case "Social groups".

The first prototype **"Social groups"** is shown in figure 3.1. (a) is the main screen, which shows an overview of the social network and the social groups as a network graph, where the nodes represent the people in the network and the edges represent the relations between the user and the people. The graph is interactive, so the user can zoom-in in order to see more details such as the names of the nodes. After choosing one of the social groups, the user will be directed to the next view, where four tabs are presented. The first is the "People"-tab, which shows the members of the chosen group. The second is the "POI"-tab (b), which shows the top favourite places of the group. For each place a time spiral is displayed, which shows when the group members have been at the place. The third is the "History"-tab (c), where a time interval can be specified in order to see how the different POIs have changed the group in terms of number of relations, relation strengths etc. The fourth is the "Links"-tab (d), which shows the members who form the strongest connection between the user and the group.

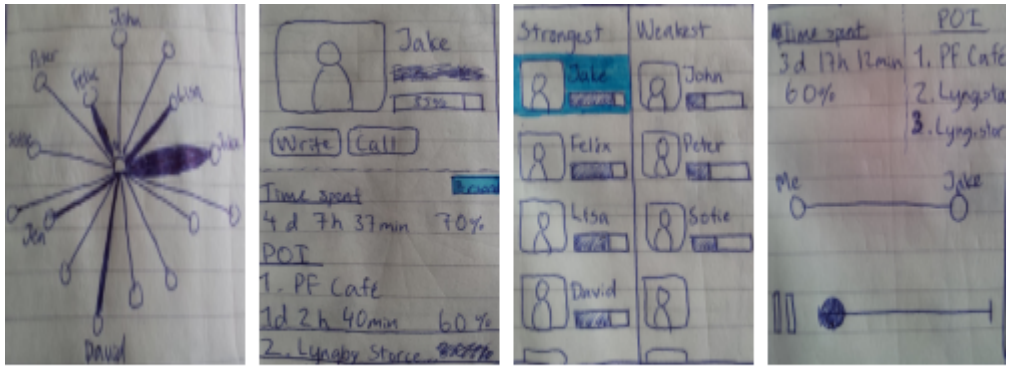


Figure 3.2: Main images of the paper prototype for the use case "Strong and weak relations".

The second prototype **"Strong and weak relations"** is shown in figure 3.2. This prototype consists of three tabs. The first is the "Network"-tab (a), which shows an overview of the user's relations. This is also a network graph. Here the thickness of an edge represents the strength of the corresponding relation. This graph is also interactive, where the user can zoom-in and tap on the nodes in order to see more information on the friends in the network. When the node "Jake" is tapped, the profile of the friend Jake is shown (b), where the relation details between the user and Jake are displayed. The second tab is the "Top/bottom"-tab (c), which shows the top and bottom relations determined by relation strength. The third is the "History"-tab (d). This tab gives the user the possibility to see how the relations between the user and his friends have changed over time. By setting a time interval, the user can play an animation of either the whole network or an individual relation. The animation shows the change of relation details such as relation strength, favourite places etc.

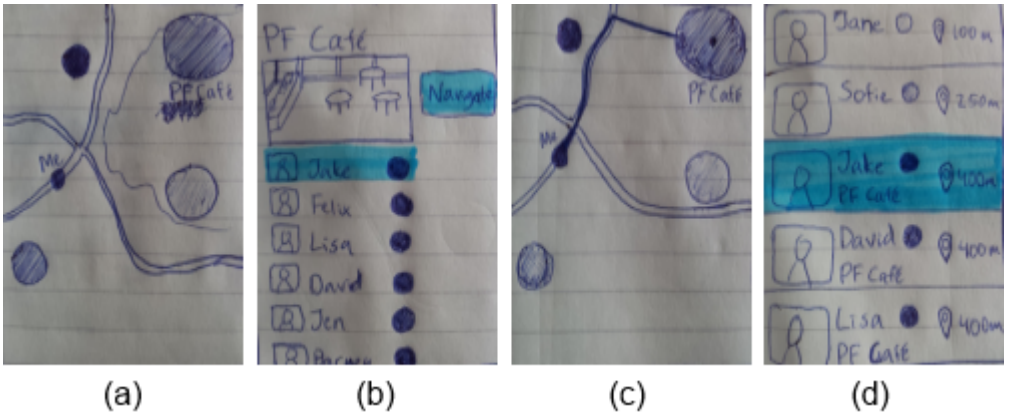


Figure 3.3: Main images of the paper prototype for the use case "Map".

The third prototype **"Map"** is shown in figure 3.3. It consists of two tabs. The first tab "Map" (a) shows a map containing the people from the user's social network according to where they currently are located or recently have been located. The people are colored according to their relation strength with the user. More than one person at the same place is displayed as a cluster. The color of the cluster represents the average relation strength of the people in the cluster and the size represents the number of people in the cluster. When zooming in on the map the clusters will be broken into smaller clusters and eventually into nodes representing the individual persons. Tapping on either a person or a place shows the associated page, where details are shown. Furthermore the user can both see where the person/place is located on the map and get a navigation route from the user's current location to the location of the person/place. (b) shows a detailed page of the place "PF Café". (c) shows the navigation route from the user's current location to the PF Café. The second tab "List" (d) shows a list of the people in the user's vicinity sorted by distance. For each person relation strength, location and distance is shown.

1. iteration test

The first three prototypes were only tested on one user. The plan was to test on three users, but this failed due to lack of planning. Still the tests were evaluated and the user gave useful feedback on the prototypes. The test results for the test-user are shown in Appendix A.

The **introductory questions** revealed that the users primarily use Facebook

and LinkedIn for viewing and interacting with their social relations. But they can't use these networking sites to learn more specifically about their social relations. Information about the relations such as the strength of a relation are now only found in the friend status, which is either friends or not friends. Otherwise the test-users don't have a solution for learning about ones social relations and their behaviour, and getting help in strengthening their social relations and social network as a whole.

Test of "Social groups"

The test revealed several difficulties related to the prototype development. One such example was the need to have a home-button, which lets the user return to the homepage. More important were the problems related to the concept.

The first problem for the users was that they didn't understand what purpose the tab "History" has, since the name itself isn't self-explanatory. The functionality in "History" should therefore not have its own tab, but should be integrated in the "POI"-tab, because it is linked to the functionality in the "POI"-tab.

The second problem was the lack of being able to see who of one's friends are the best links between oneself and the weaker relations. This means who of your friends are the best in connecting and eventually strengthening the bond between you and your individual weaker relations. The "Links"-tab has a similar functionality as it shows the best links between the user and a whole social group. Again since this functionality is related to the members of the social groups, it should be integrated in the "People"-tab, where the best connections to the social group are shown in the top followed by the rest of the members of the group.

The last problem was that the favourite places/POIs only were shown for one group at a time chosen on the homepage. It was preferred to see the places for all the relations at once instead, after which the user for example should be able to tap on the spiral graph, where there is activity, and see to which relations and social groups the activity belongs.

Summary:

- "History"-tab not understood. Integrate it in the "POI"-tab.
- Show best connections in "People"-tab and remove "Links"-tab.
- Can't see the best connections to one's weaker relations.
- Show favourite places not only for one group, but all relations.

Test of "Strong and weak relations"

This test also revealed some problem areas to take care of. The first is the lack of a search field in the "Network"-tab, which lets the user search for a specific relation in addition to being able to filter by relation strength. Related to this problem is the notion of relation strength. The test-users didn't understand the percentile-unit and what it corresponds to in real life. The notion of the time the user and a friend had spent together both in general and at different places wasn't understood either. This problem refers to the profile of Jake, where the detailed relation strength is represented both in time- and percentile-units.

A suggestion from the user was to show Jake's own favourite places in his profile rather than showing the places, which the user and Jake share. The reason was that the user doesn't need to know where he has been together with Jake, since this doesn't tell where Jake himself prefers to go. Viewing Jake's own preferred places will give the user an indication of where Jake can be met in order to strengthen their relation.

The last significant problem is about the information shown when the animation is being played. In addition to the date and time, which is now shown while playing, the place should also be included as it tells the user what has triggered a specific change in the relations. Otherwise there have also been small problems related to the development of the prototype, such as the date/time-button being too small.

Summary:

- Add search field in "Network"-tab.
- Relation strength in time- and percentile-units not understood.
- Show Jake's own favourite places instead of shared places.
- Show place triggering change in relations in animation.

Test of "Map"

Again this test revealed problems to solve. The first problem is about filtering the map. Instead of filtering by the relation strength in percentile the test-users suggest filtering by more simple terms such as strong, weak etc.

The second problem targets Jake's profile. The main components in the profile view are the two buttons: "Show on map" and "Navigate". Since these are both related to the map and the profile otherwise seems empty for the test-users, they

don't see the need for having a separate profile view. A bubble containing the "Navigate"-button could be shown, when the user taps on a person on the map. Including the "Show on Map"-button is redundant, because the map already is displayed.

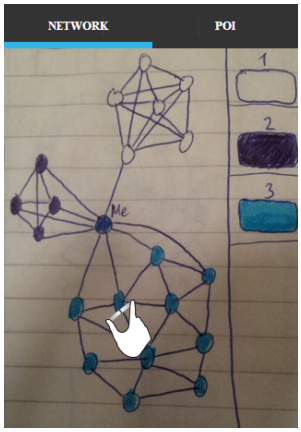
Additionally there were again smaller problems such as misunderstanding of the color representation of the relations on the map. A test-user wanted to add that he means that this concept has a great potential of adding value, since it helps the user to find people that one can meet and strengthen their bond with.

Summary:

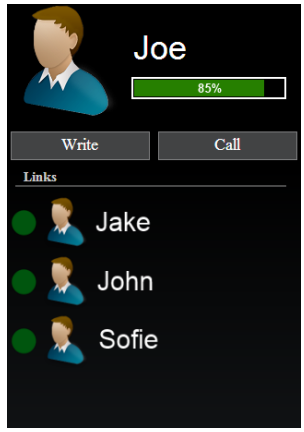
- Filter map by strong, weak etc.
- Remove profile view. When user taps on person in map, show bubble with "Navigate" button.
- Good concept, because it helps to find and strengthen relations.

2. iteration

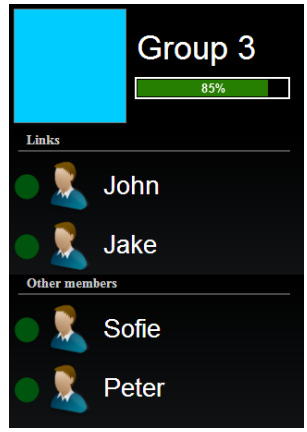
For the second iteration the feedback and suggestions from the test of the first three prototypes were used as the beginning requirements when building the new prototypes. Again three prototypes have been built, and the new screens of the prototypes are shown in figure 3.4, 3.5 and 3.6.



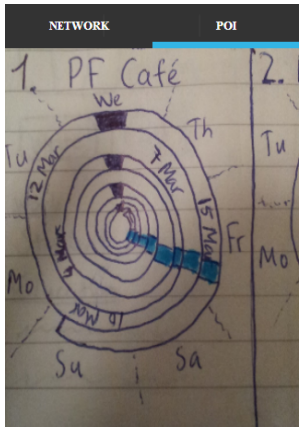
(a) Network



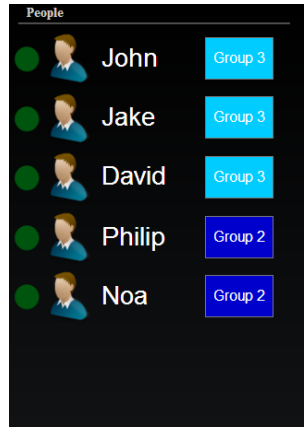
(b) Profile page



(c) Group page



(d) POI

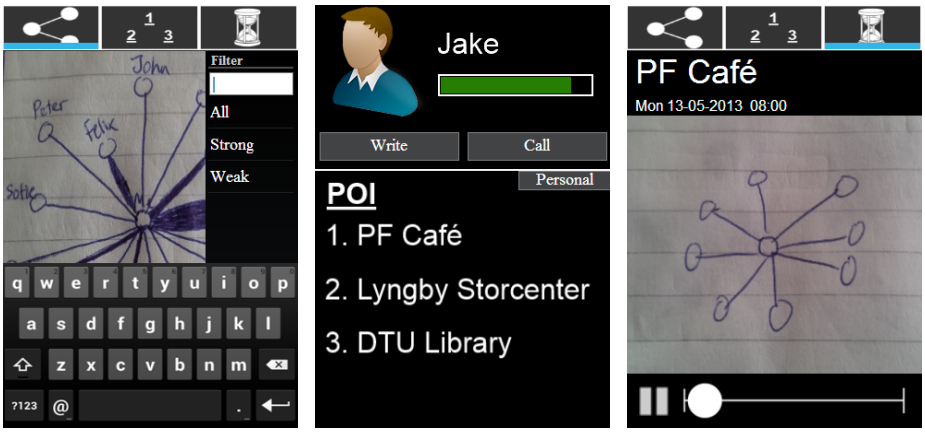


(e) People at place

Figure 3.4: Prototype: "Social groups 2"

The first prototype **"Social groups 2"** shown in figure 3.4 is based on the prototype "Social groups" from the first iteration. The main view is now split into two tabs. The first tab is the "Network"-tab (a) containing a network graph. In addition to the graph's functionalities from the first iteration the user can now also tap on a single person on the graph. This opens a profile page of the person (b), where the user can write to and call him/her. If the person is a weaker relation, the profile page will additionally list the best links/connections to the person. Tapping on a group now opens a group page (c) showing the user's relation strength to the group, the best links to the group and the rest of

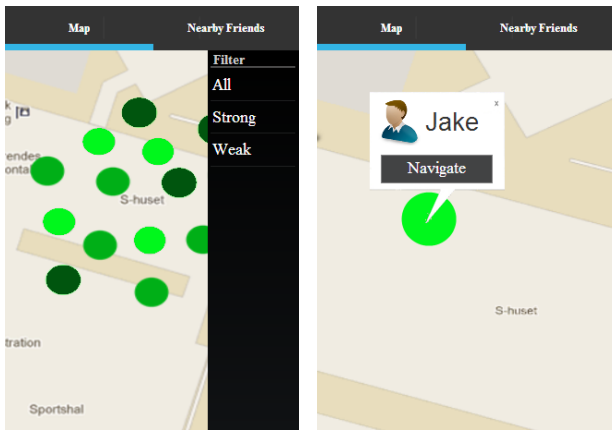
the members of the group. The "POI"-tab from the first iteration is now moved to the second tab of this prototype (d). Unlike the first iteration the time spiral now shows activity from all the people in the network and not only from one group. Tapping on an activity-block on the spiral opens a new page showing the people from the network, who have been present at the place at that time (e). Furthermore the group name is shown in a button beside each person. Tapping the button directs the user to the corresponding group page.



(a) Search-function (b) Profile page (c) Animation

Figure 3.5: Prototype: "Strong and weak relations 2"

The second prototype **"Strong and weak relations 2"** shown in figure 3.5 is based on the prototype "Strong and weak relations" from the first iteration. The filter-menu now has a search function (a), where the user can search for individuals by their name. The relation strength is now only represented as the colored bar (b), where the percentile number from the first iteration has been omitted. The profile of a person now only shows the person's own favourite places (b). The time spent together in time- and percentile-units has been omitted. The last change from the first iteration is in the animation (c). When a significant change occurs in the network during the animation, the place triggering the change will be displayed. For example, if five new relations are created at the same time, the place causing this change will be displayed. Otherwise the prototype is similar to the previous version from the first iteration.



(a) Filter-menu (b) Profile-bubble

Figure 3.6: Prototype: "Map 2"

The third prototype **"Map 2"** shown in figure 3.6 is based on the prototype "Map" from the first iteration. The first change to the prototype was in the filter-menu (a). Now the user doesn't filter by relation strength in percentile-unit but by strong, weak etc. The other change was dismissing the profile page. When a person is tapped the user will instead be directed to the person on the map, where a bubble will be displayed as an overlay (b). The bubble contains a "Navigate"-button similar to the button in the former profile page from the first iteration.

2. iteration test

The three prototypes were tested on three users, where patterns in the evaluation and user feedback were identified. The test results for each test-user are shown in Appendix B.

The **same introductory questions** were again asked in order to confirm the answers from the first iteration and possibly reveal new answers. The answers again revealed that Facebook was used in order to view ones social network and handle ones social relations. Furthermore some users identify which stronger relations they have by viewing their contact-list on Skype, since Skype only contains one's "good" friends.

Test of "Social groups 2"

The test didn't contain any significant problems, but rather some suggestions from the test-users. Three suggestions have come to light. The first is that the network graph should be limited to only contain the user's friends and friends' friends meaning that the graph should only contain nodes with a distance of at most 2. Displaying people with a distance of 3 or more will make the graph too crowded in a realistic example, where too many nodes and edges are present. Furthermore it is people, whose distance is at most 2, where there is a significant chance of befriending them. The second suggestion from the test-users was to use images to represent the people in the network graph, because it is easier to identify people by their faces than their names. The third suggestion was regarding the spiral. In addition to showing people's activity as blocks, the spiral should also show the user's activity. The user being at a place at the same time as other people indicates that they share interests. The last comment from one of the test-users was that the concept is relevant for a student at a university, especially a new student, because a student generally has a big focus on social networking and wants to know where the "popular" places are at campus.

Summary:

- Only include friends and friends of friends in network graph.
- Use images to represent people in network graph.
- Show user-activity in spiral.
- Concept is relevant for students.

Test of "Strong and weak relations 2"

The test produced two ideas on how to improve the user experience. The first is to show the best links/connections, when tapping on a relation, similar to the prototype "Social groups 2". The second is about the animation. When an animation is playing and a new relation is created, the animation should show through which existing relation the new relation is born. This means if the user's friend A has been responsible for the user becoming friends with A's friend B, then this should be clear from the animation.

Summary:

- Show best connections, when tapping on a relation.
- In animation, if friend A is responsible for the user and B becoming friends, then show A.

Test of "Map 2"

The test brought to light a bigger problem related to the concept. The concept of knowing where friends and acquaintances are creates a privacy-issue. It isn't all people who want others to know where they are at all times. Therefore this is something each user has to accept before the concept can work. The test-users again came with a suggestion regarding the representation of the people in the network graph. When zooming in on the map in order to see more details, the colored dots with names should be replaced with the face-images of the corresponding persons, since the user then isn't required to tap on a person and read his/her profile-page if the name is forgotten. Another idea was to represent the nearby friends as a radar, where the user is in the center surrounded by the friends, all represented by images of their faces. This will not only show how far away the friends are, but also give an overview of where they are compared to each other and the user.

Summary:

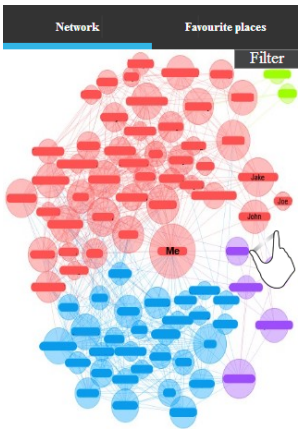
- Knowing the location of people creates privacy-issue.
- Use face-images instead of colored dots when zooming in on map.
- Show nearby friends as a radar.

3.2 Design validation

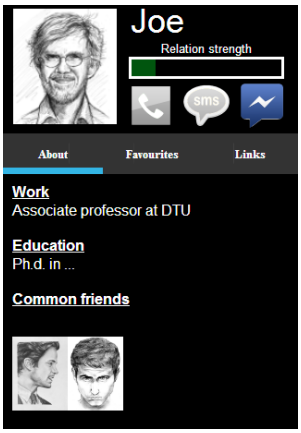
The prototypes from the first two iterations have been low-fidelity prototypes, where the screens were drawn on paper and then used as the base for the prototypes. These two iterations helped to validate the ideas and concepts, but also reject unnecessary features and bring into light new problems and uncovered needs, which may be solved by adjusting the prototypes. In the next iteration the prototypes have been built as mid-fidelity prototypes, meaning they have been built more detailed in terms of both visual design and navigation. The screens aren't based on paper drawings any more, but have been created directly in Axure supported by an image editing software, which was used to create visual elements such as graphs and icons. Even though the interactivity is limited, the prototypes still help to test the visual elements and how the user understands and interacts with the interface. The tests in the next iteration follows the format used in the previous iterations.

3. iteration

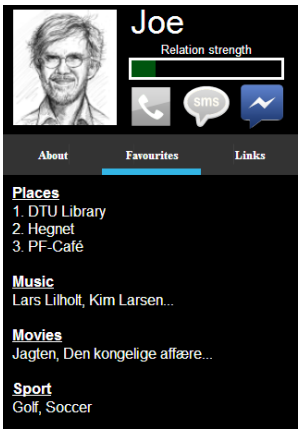
Again the feedback from the previous tests in the second iteration have been used as requirements for the third iteration. This time only two prototypes have been built, and the new screens of these are shown in figure 3.7 and 3.8.



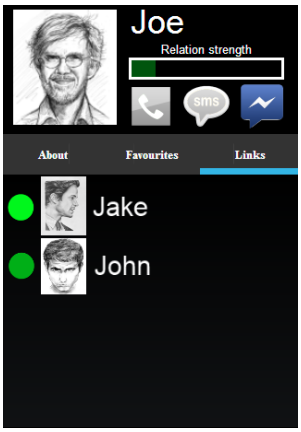
(a) Network



(b) Profile - About

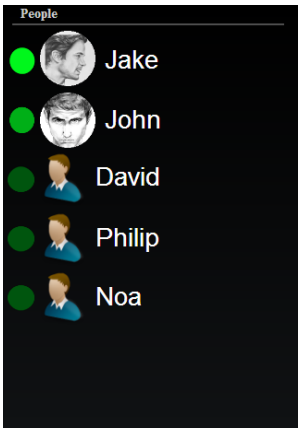


(c) Profile - Favourites



(d) Profile - Links

(e) Favourite places

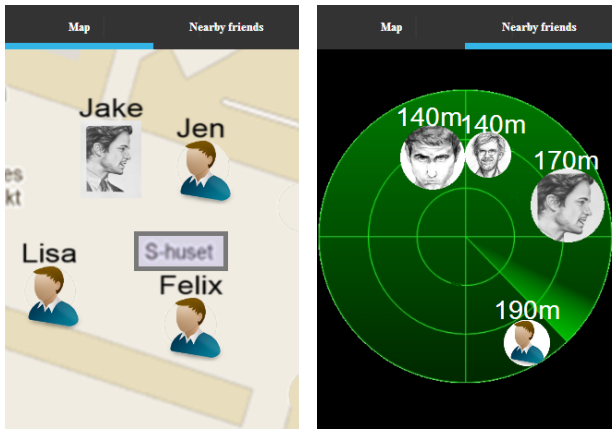


(f) People at place

Figure 3.7: Prototype: "Relations"

The first prototype **"Relations"** shown in figure 3.7 is based on both the prototypes "Social groups 2" and "Strong and weak relations 2" from the second iteration. After fixing the two prototypes and applying the suggestions from

the users, it was clear that the two concepts began to converge in terms of their functionality and which needs they were meant to cover. Therefore it was decided to merge the two prototypes into one, which only includes the most important functionalities from the two, which were also well-received by the test-users. The new prototype consists of two tabs: "Network" and "Favourite places". The first tab contains a network graph of the user (a), friends and friends' friends. When tapping on a person in the graph the corresponding profile page is shown. This page displays personal information (b), interests (c) and the best links to the person (d). The second tab contains the spiral from "Social groups 2", which now additionally marks the activity-blocks with an icon if the user also has been present there (e). Tapping on an activity-block shows the people, who were present at the place at that time (f). From "Social groups 2" the focus on social groups has been removed, since the test-users didn't have the need for viewing the social groups in their social network. "Relations" now focuses on the individual relations and how these can be strengthened or created. From "Strong and weak relations 2" the tabs "Top/bottom" and "History" have been omitted altogether, since these were seen as redundant compared to the other already included functionalities.



(a) Map with images (b) Radar

Figure 3.8: Prototype: "Map 3"

The second prototype **"Map 3"** shown in figure 3.8 is based on the prototype "Map 2" from the second iteration. This prototype is very similar to the previous version. The two suggestions from the feedback in the second iteration test have been applied to the prototype. The first is representing the people as images, when zooming-in on the map (a), and the second is showing the nearby friends on a radar (b). This helps the user to view not only how far away the friends

are, but also in which direction.

3. iteration test

The two prototypes were tested on three users, where patterns in the evaluation and user feedback were identified. The test results for each test-user are shown in Appendix C. In this iteration the interviews didn't include introductory questions, since the two previous iterations already have validated that the identified needs are present and that the prototypes have potential to bring value to its users.

Test of "Relations"

The test didn't reveal any significant problems related to the concept of the prototype. There were several minor changes related to the visual design such as changing titles and names, moving information etc. A common problem related to the visual design was about the time spiral in the tab "Favourite places". The test-users had trouble in understanding the colors of the activity-blocks and the smiley, which indicates if the user has been a part of the activity. They suggested that help such as labels or an "info"-button explaining the spiral should be available. Another suggestion from a test-user was to change the network graph. It was hard for him to get an overview of the graph and the relation strength with the different people. Instead of using the size of the nodes to represent the relation strengths he suggested to use rings. The user is in the centre and a number of rings surround him. The ring closest to the user contains people, who have the strongest relations to the user, and the ring furthest away contains people, who have the weakest relations. This way the user can get a quick overview of, who are the "best friends", "good friends", "friends" and "just acquaintances". An example image can be seen in the following figure 3.9. Apart from the changes the "Favourite places"-tab received positive feedback due to the swiping interaction and the easy overview of the people's activity through the time spiral.

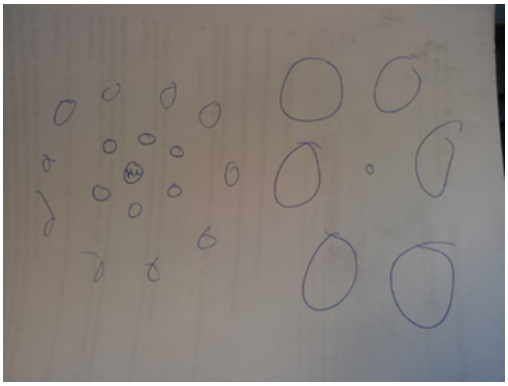


Figure 3.9: Ring network visualization

Summary:

- Trouble understanding colors and smileys in spiral. Add legends or "info"-button.
- Try replacing network graph with ring representation.
- Positive feedback due to swiping interaction in profile page and easy overview of people's activity with time spiral.

Test of "Map 3"

This test also didn't reveal any significant problems related to the concept of the prototype. Though there were two main problems related to the visual design and navigation. The first was that the map required too many interactions when wanting to see the faces, who were present at "S-huset". Instead the test-users suggested that the map has two levels. The first is where the user can see the different groups of people as clusters. The second level is when the user zooms in, where the clusters are replaced with the images of the persons, who are present at that location. This eliminates the middle step, where the persons are represented as dots, which in the tests were mistaken as smaller groups of people. The second problem was related to the radar. The radar was a good idea according to the test-users, but it still needs to be optimized. The test-users all saw a common problem in the lack of a name on each person on the radar. But even with this and the other changes, the radar has a disadvantage if it becomes too crowded with people or if the user wants to see people who are further away than the limit of the radar. Therefore a suggestion from a

test-user was to use a list-representation as in "Map 2", but with the addition of an arrow for each person showing the direction to them.

Summary:

- Only use two zoom-levels on map. Zoomed out: show groups as clusters. Zoomed in: show people as images.
- Replace radar with list, where an arrow is added to each person showing the direction to them.

3.3 Requirements

Through the early and design validation the user needs have been identified and verified, the solution ideas have been tested for proof of concept and the prototypes of the ideas have been tested for usability. From this a list of requirements have been extracted, which is shown in table 3.1.

Feature	Description	Priority
Network view	The user shall be able to see his network of friends and get an overview of how closely they are related to him.	Medium
Favourite places view	Graphs of the favourite places of the network shall be shown. For each place the user shall be able to see patterns of when his friends prefer to go to the place. For example if at least 10 friends go to the favourite place "Lyngby Storcenter", this should be understood from the graph. Furthermore the user shall be able to see which friends have been there.	Medium
Map view	In order to see how the friends in the user's network are located and where there is interesting activity, a map shall be available. On this map the friends shall be placed according to their current position. When the map is zoomed out, people shall be represented as circles/clusters. People close to each other shall fall under the same cluster. When the user zooms in on the map, the cluster shall be replaced with the corresponding people, who belong to the cluster. Each person shall be represented by their profile image.	High
Nearby friends view	The friends in the user's vicinity shall be shown. For each nearby friend the image and name of the person shall be displayed so the user can identify the friend. Additionally the distance to and the direction of the friend shall be displayed, so the user knows where the friend is located compared to himself.	Low
Profile view	When a friend is tapped in either of the aforementioned views, then a profile page of the friend shall be shown. For all people the name, profile image and relation strength shall be displayed. Furthermore basic information about the user shall be displayed, which includes education, work and interests.	High
Profile - Favourite places	For each friend the user should be able to see their favourite places in order to get an idea of, where the friend spends the most of his time and where there is a chance that the user may meet him and possibly strengthen their relationship if necessary.	High

Feature	Description	Priority
Profile - Common friends	For each friend the user shall be able to see the friends they have in common. The number of common friends will indicate how well they know each other and how much their two networks overlap. Additionally the common friends may be a help when the user is trying to strengthen his relation with the friend.	High
Profile - Contact friend	For each friend the user shall be able to contact him either by phone call, sms or facebook messaging.	High
Profile - Locate friend	For each friend the user shall be able to see where the friend is located on the map, and if needed get a navigational route showing how to reach the friend from the user's current position.	High
Filter and search	In the Network view and Map view the user shall be able to filter the view by relation strength and search for a specific person by name. A filtering choice could be to only show the "good friends".	Low

Table 3.1: Requirement specification

The prioritization of the requirements are specified according to the feedback from the tests. The highest prioritized feature is the Map view, because it helps to get a live image of the user's quantified relations and their behaviour. The other high priority is the Profile view and its features, because they help to both learn about a relation between the user and a friend, and maintain or strengthen the relation.

The Network view and Favourite places view aren't critical features, which have to be implemented in the next iteration. Still they are important, because they also give an overview of the quantified relations and their behaviour.

The Nearby friends view, filter-menu and search-function are only nice-to-have features, which support the other features.

Chapter 4

Data collection and visualization

This chapter is about the studied tools, which can be used for data collection and visualization. The chapter consists of four sections. The first section covers the current options available for data collection. The second section describes the different options available for visualizing a network graph, and the third section for visualizing a spiral timeline. Since some of these visualizing options are Javascript libraries, the solution on using Javascript libraries in an Andriod implementation will be described in the fourth section.

4.1 Data collection

For collecting smartphone sensor data and social data two options are presented in this thesis. The first is the earlier introduced SensibleDTU, which both tracks sensor data and social data on its users. The second option is to manually collect the raw sensor data using Android's location and sensors API[1] and fetch the social data using the Facebook SDK for Android or the Facebook Graph API.

The first option is prioritized over the second, because of two reasons. The first

[1] http://developer.android.com/guide/topics/sensors/index.html

is that SensibleDTU automatically collects both sensor data and social data for all its users and uploads it to a server. This means that the data doesn't have to be fetched manually using the aforementioned APIs and be stored in a new server. The second reason is that there isn't a need for keeping track of which social data is connected to which sensor data. Fetching data from SensibleDTU using a user as input returns both the corresponding social data and sensor data. In case the provided social data in the SensibleDTU server isn't sufficient, it can be complemented with the second option.

SensibleDTU

The collected data of all users of SensibleDTU is stored in the SensibleDTU database. This data can be fetched through a probes API created for this purpose. In order to fetch data, a URL query must be done. The base of the URL is as following:

`http://curie.imm.dtu.dk/sensible_outbound/v1/`

The URL must both contain which probe the data must be fetched from and the token of the user whose data must be fetched. Additionally other query parameters can be specified (Ref). The following shows an example of a complete URL query:

```
http://curie.imm.dtu.dk/sensible_outbound/v1/location?token=
16c40455-533a-4a9b-96e4-de2d79c05e77&limit=5&descending=true
```

The data will be returned in a JSON format, which contains the collected probe data together with the timestamps of when the data was collected.

4.2 Network graph

There aren't any Android libraries available for drawing network graphs. Some Java libraries exist such as JUNG, but Android doesn't support them. Therefore three other options have been explored. The first is to use one of the Javascript libraries available for visualizing network graphs, which can be used through an Android WebView. The second is visualizing the network of friends with basic images. The third is creating a new Android library for drawing network graphs using the Android Canvas, which offers the possibility for custom drawing

different objects[2]. Since this isn't a part of the focus of the thesis, this option won't be further investigated.

The first option is preferred over the second, because it includes the drawing of an actual network graph. But executing Javascript code through a WebView also involves some risks. One significant risk is about the lack of interaction. Since the Javascript libraries are meant to be executed in a computer's web browser and the supported interaction tool is a computer's mouse, some of the smartphone's interaction gestures, such as pinch-zoom, may not be supported. Another significant risk is that the implementation of the graph doesn't run efficiently, because it is shown through a WebView and not directly in the Android layout. Therefore the second option is included as a plan B in case the first option isn't successful.

Javascript libraries

There are several Javascript libraries for drawing network graphs. In this thesis three open-source libraries have been studied **sigma.js**, **D3.js** and **JavaScript InfoVis Toolkit**, which all offer the possibility to visualize a network with nodes and edges. The properties of the nodes and edges can be customized to represent the strength of the relations in the network.

sigma.js is a library for drawing network graphs. This library is included, because it requires minimal code to create the simplest graph and it still gives the developer the possibility to customize the different properties of the graph elements. The following code and figure shows an example of how a graph with two nodes and an edge can be created:

[2] http://developer.android.com/training/custom-views/custom-drawing.html

```
var sigRoot = document.getElementById('sig');
var sigInst = sigma.init(sigRoot);
sigInst.addNode('hello',{
  label: 'Hello',
  color: '#ff0000',
  size: 10,
  y: 0
}).addNode('world',{
  label: 'World !',
  color: '#00ff00',
  size: 10,
  y: 0.1
}).addEdge('hello_world','hello','world', {
    'size':5
}).draw();
```

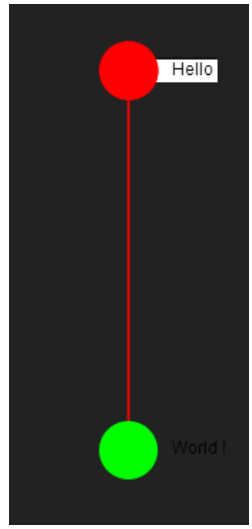


Figure 4.1: sigma.js network graph example

JavaScript InfoVis Toolkit is a library for creating different types of interactive data visualizations. It has several types of visualizations and also offer the possibility to combine different types of graphs. Here the code is also written in a Javascript script, but in contrary to sigma.js the data is fetched from a JSON Graph structure, which can contain the customized properties of the graph nodes. An example of a network graph visualization can be seen in the following figure:

Figure 4.2: Javascript Infovis Toolkit network graph example

D3.js (the former Protovis team) is a library for creating powerful visualizations, which both supports animation and interaction. It provides a wide range of visualizations and supports customizing the graph elements. Examples of network graphs are given in the following two figures:

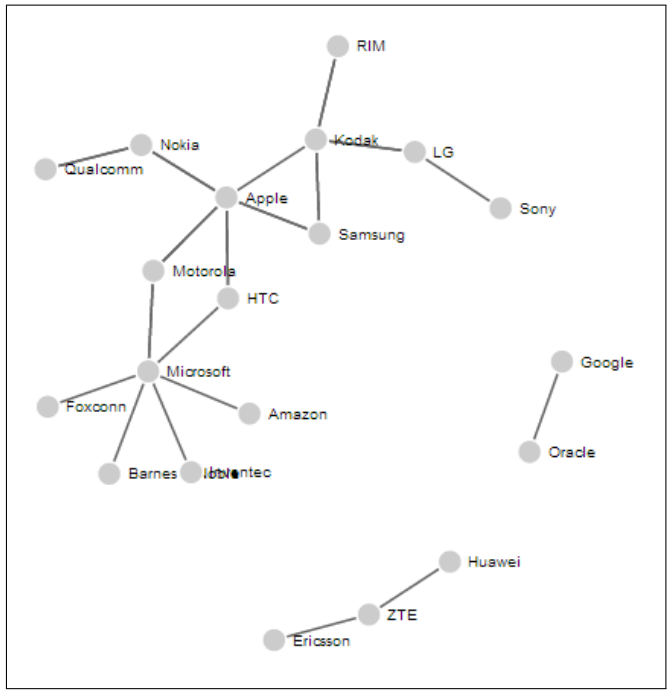


Figure 4.3: D3.js network graph example 1

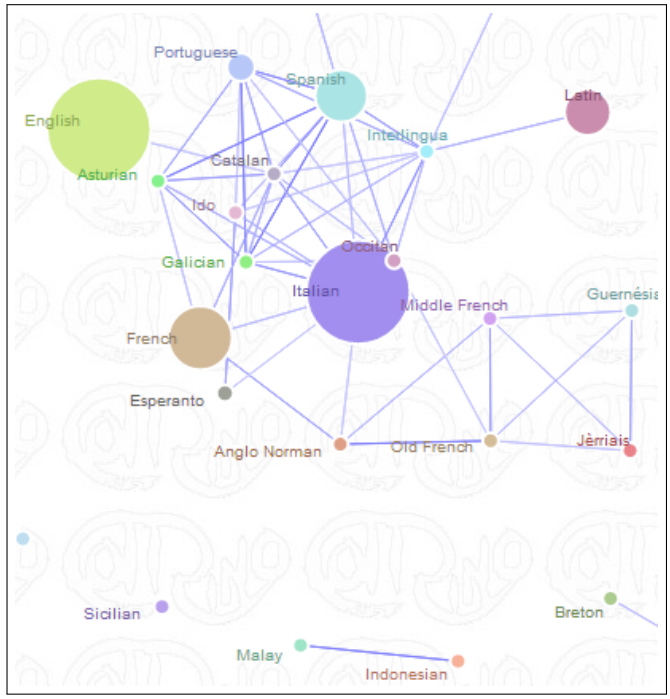


Figure 4.4: D3.js network graph example 2

All three Javascript libraries offer the possibility to visualize a network graph, but **sigma.js is the preferred library**, because it requires minimal code to create the graph.

Image network visualization

Since Android doesn't have its own library to visualize a network graph, an alternative solution is to use profile images representing the people in the network. In order to compensate for the lack of customizable node- and edge-properties, the images will be distributed into a number of rows. Each row represents a level of relation strength. The profile images in the top row closest to the user will represent the user's best friends and the bottom row will represent the least known acquaintances. The idea is inspired by a suggestion from the test-results of the "Relations"-prototype in Appendix C.1. Instead of using rings around the user, rows under the user are used to represent the different levels of relation strength. An example of the row-visualization is shown in the following figure.

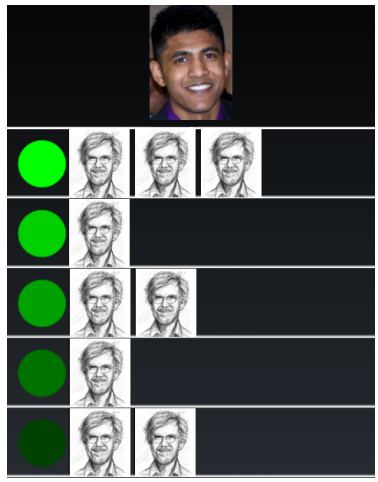


Figure 4.5: Image network visualization example

4.3 Spiral timeline

There aren't any Android libraries available for visualizing a spiral time. Therefore again other options have been explored. For visualizing a spiral timeline

only one Javascript library has been found, namely the aforementioned **D3.js**. Again the aforementioned risks of executing Javascript code through a WebView are present. Therefore two alternative options have been found: a basic timeline chart and a bubble chart, both implemented using the Android library **AChartEngine**. One of these will be used as a plan B, if the first option is rejected.

D3.js

D3.js offers the possibility to draw a spiral as the one shown in the following figure. The library though is deficient compared to the needs in this project. The graph can't be implemented and customized to resemble the appearance and functionality of the spiral timeline from the prototype "Relations" seen in figure 3.7(e). One such example is that the spiral shouldn't be a continuous line, but rectangular blocks forming a spiral line.

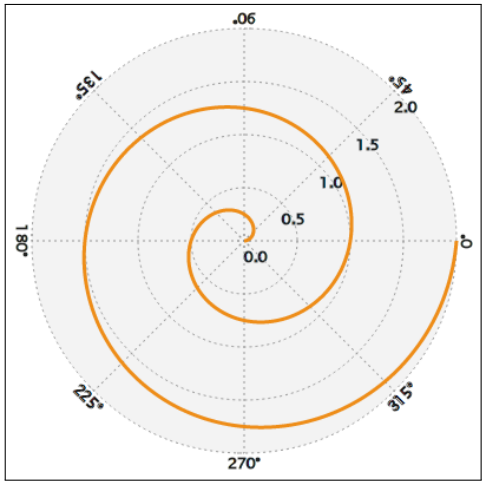


Figure 4.6: D3.js spiral example

Timeline and bubble chart

The first alternative solution to substitute the spiral timeline is a **traditional horizontol timeline**, where the x-axis represents the time and the y-axis represents the activity-value meaning the number of people present at the place.

The timeline is like the line in the spiral flattened out. Therefore the functionality of the spiral timeline can also be copied to the traditional timeline. The disadvantage of the traditional timeline is that it is harder to recognize periodic patterns in it compared to the spiral timeline. In the spiral timeline the activity on the same day or month will be easily comparable. This isn't the case with a traditional timeline, where the time is aligned horizontally. The advantage of this solution though is that the traditional timeline shows the value of the activity. This means if 10 people were present at a place on Monday and 15 people on Tuesday, the line will be higher on Monday than on Tuesday. But in the spiral timeline both activities will be represented as blocks of the same size, and therefore ignores the value of the activity. Furthermore the traditional timeline can be implemented using the Android library AChartEngine. An example of the timeline implemented using AChartEngine is shown in the following figure.

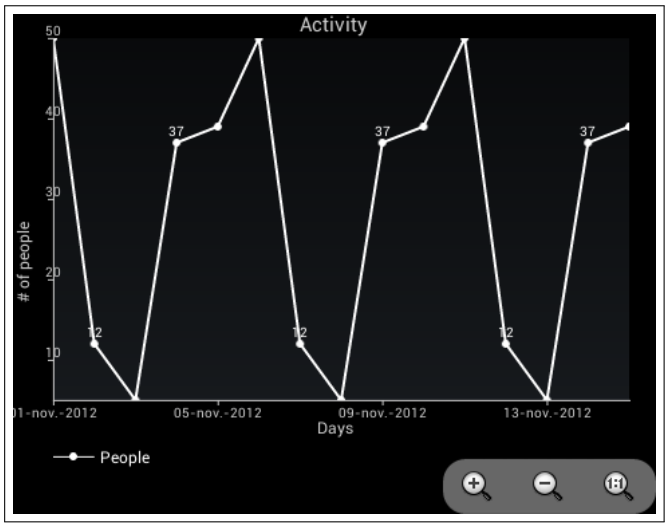


Figure 4.7: AChartEngine timeline example

The second alternative solution is a **bubble chart**, where the x-axis represents the days of the week, the y-axis the weeks and the size of the bubbles the activity-value. The disadvantage of the bubble chart is that it isn't continuous as the timelines. Furthermore the size of the bubbles can be misleading, because the size doesn't represent a value, but rather how big the value is compared to the other values in the same row. In contrary to the traditional timeline, periodic patterns can easily be seen in it, because activity on the same day or month is placed above each other. The bubble chart can also be implemented using the Android library AChartEngine. An example of the bubble chart implemented using AChartEngine is shown in the following figure.

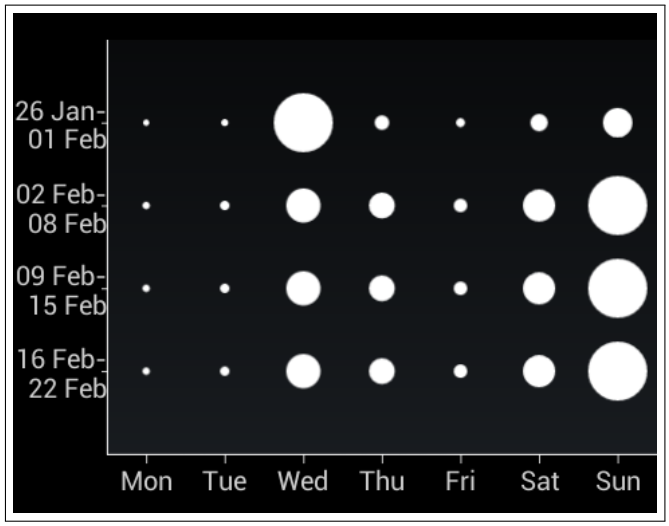


Figure 4.8: AChartEngine bubble chart example

4.4 Android combined with Javascript

In order to use Javascript libraries in an Android implementation, a WebView has to be included in the layout. The WebView functions as a web browser and displays web pages based on URLs. In the WebView a Web App must be built, which consist of two steps. The first is enabling Javascript code in the WebView. The second is creating an interface, which binds the Javascript code to the Android code. With this done the .html and .js files needed for the implementation have to be included in the "assets"-folder in the Android project. Then Android code calling Javascript code and Javascript code calling Android code can be implemented. By implementing the .html and .js files so they use a Javascript library to draw a graph, this graph can be displayed in the WebView, when the Android code is executed.

Chapter 5

Implementation

The implementation of the application is divided into the following three sections. The first section explains the progress on implementation according to the requirements specification. The second section describes the navigation in the application using a site map. The third section describes the interaction between the application and the external services, respectively SensibleDTU and Facebook API, using sequence diagrams.

5.1 State of implementation

The application has been developed using the Eclipse IDE and Android SDK[1]. It is implemented according to the requirements specification in Requirements. This sections covers each requirement and its state of implementation. For each requirement the implementation will be discussed in terms of the chosen tools, which were discussed in Data collection and visualization.

[1] http://developer.android.com/sdk/installing/bundle.html

Network view

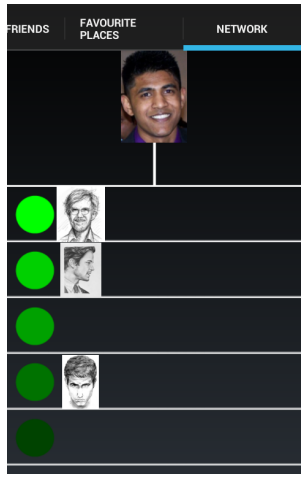


Figure 5.1: Network view

The preferred way to visualize the network of friends was to create a network graph using one of the Javascript libraries. But the risks mentioned in Network graph occured when trying to implement the preferred option. Furthermore the people in the network can't be displayed as images, but only as circled nodes. Using images would have made it easier for the user to identify each person. Therefore the alternative solution has been implemented, where the network is visualized as rows of images as shown in figure 5.1.

Favourite places view

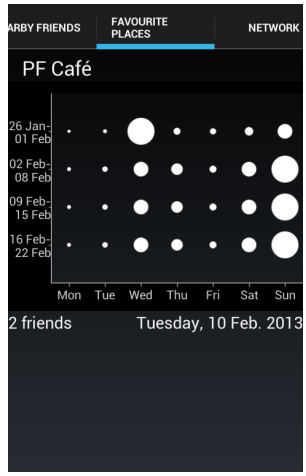
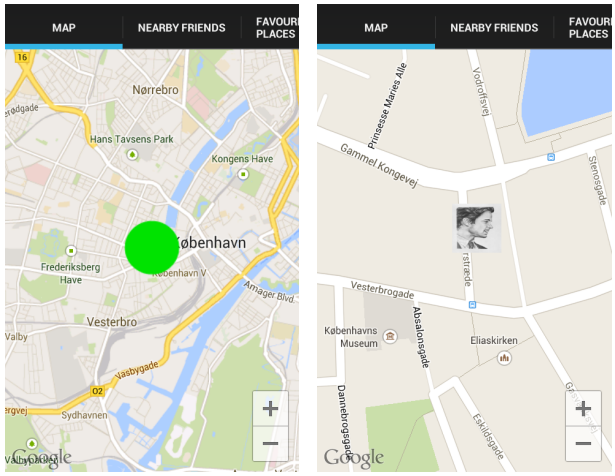


Figure 5.2: Favourite places view

The preferred way to visualize the favourite places was to show a spiral timeline for each place using D3.js. But again the risks mentioned in Spiral timeline occured when trying to implement it. The spiral can't be divided into time blocks, which can be customized to display the activity at the chosen place. Therefore the alternative solution has been implemented, which displays a bubble chart for each place as shown in figure 5.2.

Map view



(a) Zoomed out (b) Zoomed in

Figure 5.3: Map view

The map view has been implemented using Google Maps Android API v2[2]. The map shows all friends from the user's network. When the map is zoomed out, people at the same place are displayed as green clusters as shown in figure 5.3(a). The color of the cluster corresponds to the average relation strength of the friends in the cluster. When the map is zoomed in, the friends are displayed using their profile images as shown in figure 5.3(b).

[2] https://developers.google.com/maps/documentation/android/

Nearby friends view

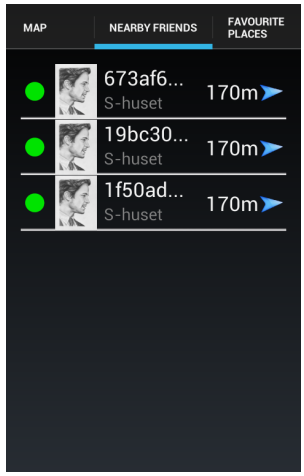
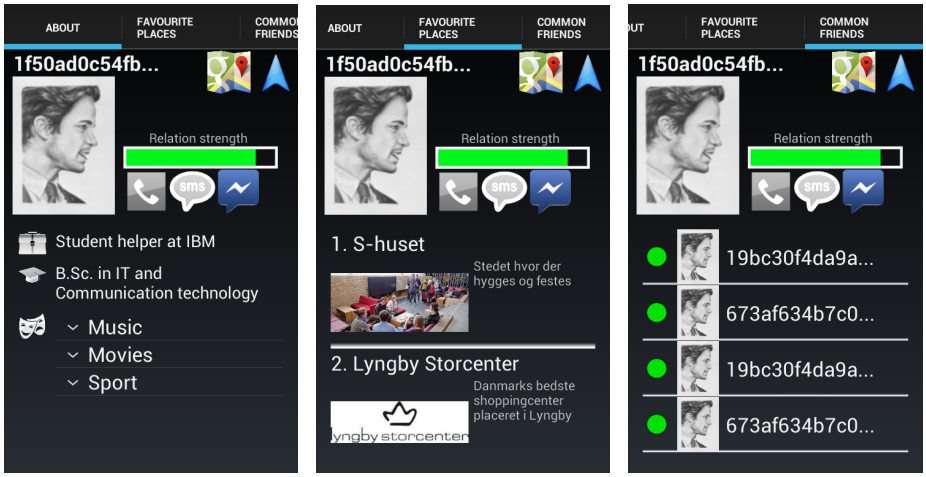


Figure 5.4: Nearby friends view

Using the feedback from 3. iteration the nearby friends have been implemented as a list, where each element has the name and profile image of the person, the distance in meters to the person and an arrow pointing in the direction of the person. The list is sorted by the distance in increasing order. The view is shown in figure 5.4.

Profile view



(a) About (b) Favourite places (c) Common friends

Figure 5.5: Profile view

When a friend is tapped the profile page of that person is shown. The profile view is shown in figure 5.5. The profile view contains the name, profile image and relation strength of that person. In order to contact him the user can either call him or send him an sms. If the phone number isn't available in the user's contact list, a Facebook message can also be sent to him. Furthermore the user can locate the person on the map by tapping the map-icon and get a navigational route to the person by tapping the arrow-icon.

The profile view also contains three tabs. The first tab of the profile view displays the basic information about the friend as shown in figure 5.5(a). This includes education, work and interests. The second tab displays the user's three favourite places as a list as shown in figure 5.5(b). Each list-element contains the name, image and description of the corresponding place. The third tab displays the common friends between the user and the friend as a list, which is sorted by relation strength in decreasing order. This tab is shown in figure 5.5(c). For each list-element the relation strength, profile image and name of the corresponding person is displayed. The relation strength is displayed as a green circle, where the brightness of the colour indicates the strength.

Filter and search

The filter and search menu for the Network view and Map view hasn't been implemented, because it has been a low priority. If it was to be implemented, it wouldn't require research in new methods or tools. The relation strength of the user's friends are now calculated in the application. By defining some levels of relation strength, such as "best friends", "good friends" etc., and relating them to intervals in the relation strength value, the filter functionality can be implemented. For example the "best friends" could be friends, who have a relation strength between 95%-100%. The search function requires information on the people in the network, such as the name. If this is available, the search function can also be implemented.

Sensor and social data

The prioritized option for fetching both sensor data and social data is SensibleDTU, which is described in Data collection. Since the data from the SensibleDTU server doesn't provide the full social profile needed for the profile view, the Facebook data will be included.

In this project access to the users' SensibleDTU tokens hasn't been granted due to privacy issues. These tokens are needed for fetching data from the server using the SensibleDTU API. Instead two text files are available, which are used as an alternative solution.

The first text file contains the location history data for around 100 anonymous persons. For each person one month of location data is available. The interval between two subsequent location recordings is 10 minutes. This means that each line in the file contains a unique id for the person, a timestamp, a position (in latitude and longitude) and the accuracy of the position (in meters).

The second text file contains the friendships between the 100 persons. Each line in the file contains two unique ids, which means that the two persons who correspond to these two ids are friends. The ids in this file match the ids in the first file.

Again since the application isn't connected to the SensibleDTU server, the Facebook tokens of the users aren't available as well. Therefore it isn't possible to use either Facebook Graph API or Facebook SDK for Android to fetch the Facebook social data. This causes some of the information about the users not being available. This includes profile image, work, education and interests.

Another feature not working is the Facebook messaging. It isn't possible to send a private message using either Facebook Graph API or Facebook SDK for Android today. Therefore the alternative solution is to post a message on the friend's wall. But since this also requires a Facebook token, the functionality of the Facebook messaging icon isn't implemented.

The two data files together give a network of 100 people, where their friendships are known and their location history is available. The names of the people aren't available though, because the text files only use the unique ids for identifying the people. But these two files provide both location and social data enough for implementing the application with limited backend functionality.

5.2 Sitemap

To understand how the application is structured, a site map is created. The site map gives an overview of how the pages in the application are linked together, meaning it gives an overview of the overall navigation of the application. This site map is shown in the following figure 5.6.

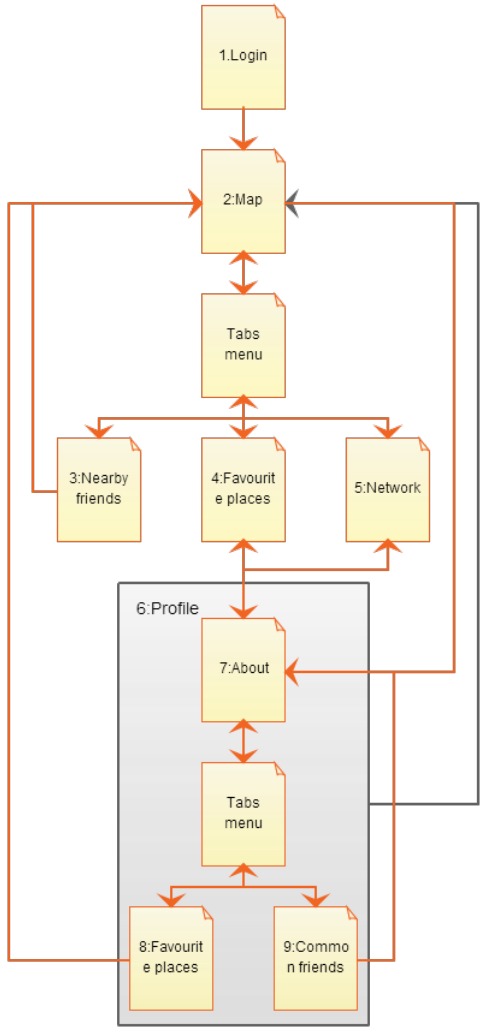


Figure 5.6: Site Map showing the navigation in the app

The first page shown to the user, when the application is started, is 1:Login. After the user has logged in, 2:Map is shown to the user. This page is the first of the four main tabs of the application. Using the four tabs the user can navigate to the corresponding pages: 2:Map, 3:Nearby friends, 4:Favourite places and 5:Network.

By tapping on a person in 3:Nearby friends, the person will be shown on the

map in 2:Map. From 2:Map, 4:Favourite places and 5:Network it is possible to navigate to 6:Profile by tapping on a person in either of the pages.

From 6:Profile the user can navigate to 2:Map again to see the person on the map. Furthermore 6:Profile consists of three tabs: 7:About, 8:Favourite places and 9:Common friends. By tapping on a place in 8:Favourite places, the place will be shown on the map in 2:Map. When tapping on a person in 9:Common friends, 6:Profile page for the person will be shown.

5.3 Sequence diagram

In order to understand the interaction between the client application and the external actors in the system, the following sequence diagrams are created. They show how the sequence of messages exchanged between the application and the servers is intended.

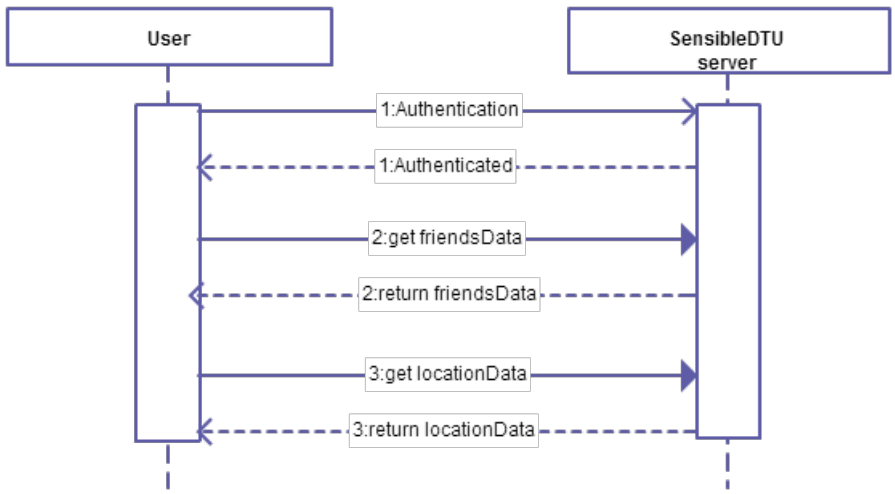


Figure 5.7: Sequence diagram: Login and fetch data

The sequence diagram in figure 5.7 shows the process of login and fetching data.

1. When the user starts the application, a unique user id will be used to request for authentication. If the user id is present in the SensibleDTU

database, an acknowledgement will be received, which lets the user proceed in the process.

2. After authentication the application requests the server for data on the friends of the user. This is basic data needed throughout the application, which includes name, profile image and friends of each friend. The latter is needed when showing common friends in a friend's profile page.

3. In order to measure the relation strengths between the user and the friends, the application requests for location data for both the user and the friends.

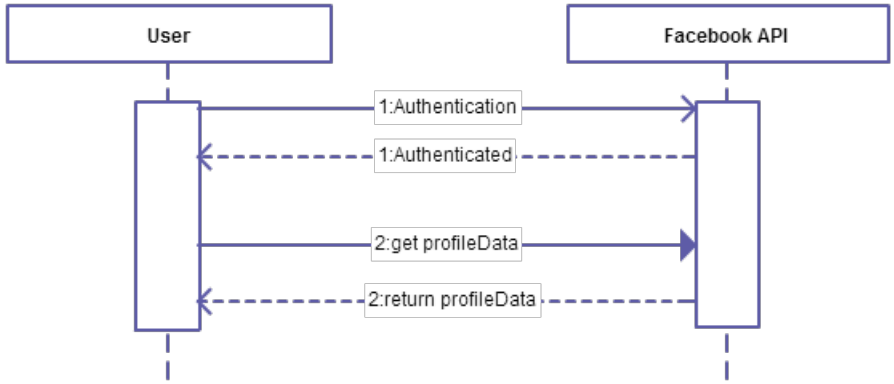


Figure 5.8: Sequence diagram: Show profile

The sequence diagram in figure 5.8 shows the process of showing the profile page of a friend:

1. When the user taps on a person in the application in order to view the person's profile page, the application will first request for authentication to see if the person exists in the Facebook API. If yes, an acknowledgement is received and the process proceeds.

2. After authentication the application will request the Facebook API for the person's profile data. This data includes name, profile image, work, education and interests.

Facebook API represents either Facebook Graph API or Facebook SDK for Android. Both solutions can be used for the purpose of getting profile data.

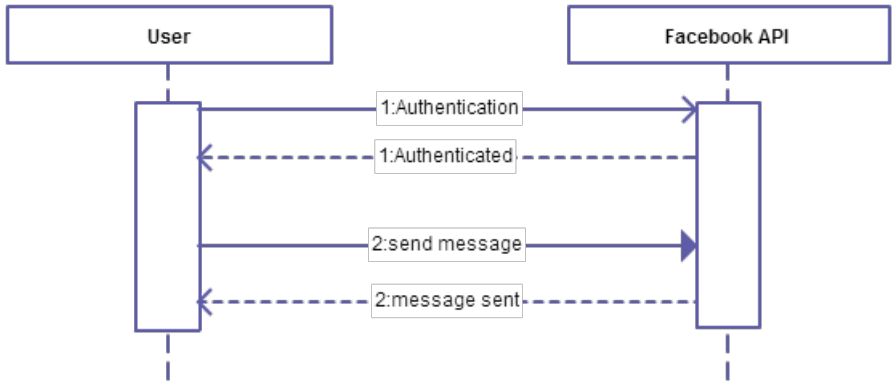


Figure 5.9: Sequence diagram: Send message

The sequence diagram in figure 5.9 shows the process of sending a message to a friend:

1. When the user taps the Facebook message icon on the profile page of a friend, the application will first request for authentication to see if both the message sender(user) and message receiver(friend) exist in the Facebook API. If yes, an acknowledgement is received and the process proceeds.
2. After authentication the application will try to send a message from the user to the friend using the Facebook API. If successful, the application will receive an acknowledgement.

Again Facebook API represents either Facebook Graph API or Facebook SDK for Android.

Chapter 6

Discussion

It has now been established that it is advantageous to quantify social relations. Through the iterative design process it has been validated that the identified user needs are present and that the proposed solution satisfies these needs and thereby adds value to the users. But still it is realized that the design process had room for improvement. The following problems and related improvements were found:

- Instead of testing on only one user in the first iteration, at least three test-users should have been included. The feedback from one test-user might not be enough to generalize and conclude anything about the prototypes. Testing on three users would have helped to find patterns in the discovered problems and user feedback. Furthermore there is a possibility that errors found in the following iterations would have been eliminated already in the first tests. If more time was available in the design process, more than three test-users would have been included in order to get as much feedback from test-users as possible.
- The second possible improvement is to test the features separately instead of testing a set of features together. The intention was to test only the necessary features as MVPs, but after the first iteration the design process diverged a little from this path. Instead of testing only the features with

major changes, the complete prototypes were revised and tested again, because smaller problems were introduced in all features.

- The last improvement is to focus more on the beginning interview and less on the tasks. Instead of writing specific detailed tasks, the user should have been let to use the prototypes more freely and explore the features on their own. This would have promoted the dialogue between the tester and test-user, which would have led to more useful feedback related to the proof of concepts.

Incorporating these improvements in future iterations will make the testing more efficient. Another problem discovered in the second iteration of the design process was the privacy-issue related to the "Map 2" prototype. A solution to this problem wasn't included in the third iteration prototype "Map 3". If it is decided to keep this feature in future iterations, finding a solution to the privacy-issue will be a priority.

One area, which still hasn't been studied yet in this thesis, is how to actually quantify the social relations based on location data. The focus in the thesis wasn't to find a solution for quantifying social relations, but rather to create a user experience design, which acts as a first proposed solution for viewing, maintaining and strengthening one's quantified relations. Therefore in order to continue the project, a solution to quantifying one's social relations must first be found, which will be investigated in the next section.

6.1 Quantify social relations

By using location data it can be determined whether two people were near each other at any given time. But two people being at the same place doesn't necessarily mean that they know each other and are doing something together. Two students attending the same lecture can be a coincidence. Facebook friendships helps in this situation to some extent. Two people who are friends on Facebook do share a social relation, but the strength of their relation is still unknown. Therefore it is necessary to understand the activity and behaviour of two people before trying to understand their social relation. In order to do so, data on both space and time must be included. If GPS positions can be translated into different labels such as "DTU building 324" and "Restaurant", these labels together with time labels can be used to interpret both where a person is and what he is doing. For example a student being in a DTU building Monday morning probably is attending a lecture. But the same student being there a Friday

evening might be partying at the Friday bar. This shows how the location label combined with the time label tells what a person is doing.

When a student is located in a building at DTU, it is possible to determine what the person is doing based on both space and time. An example is shown in the following figure 6.1.

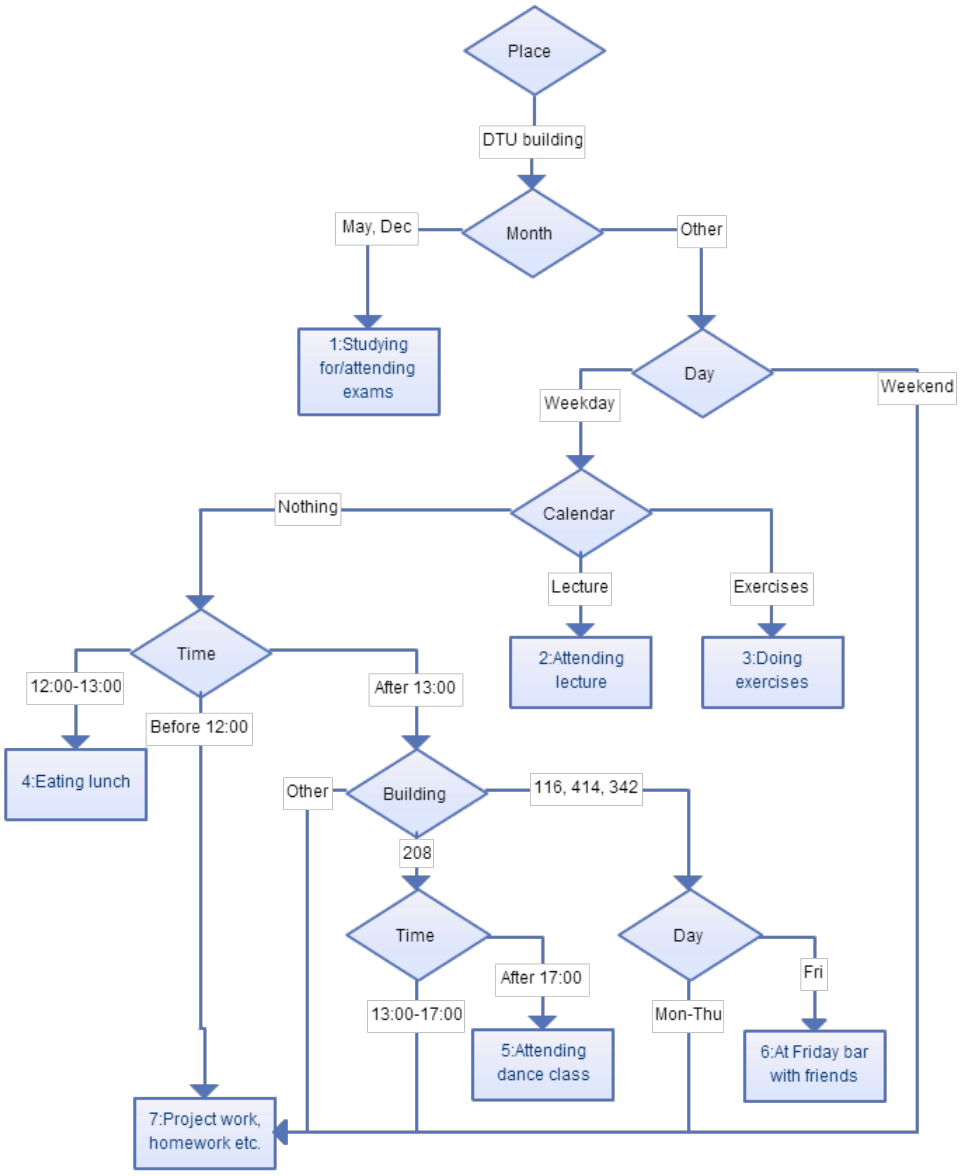


Figure 6.1: Decision tree showing how to determine a person's activity when located in a DTU building.

The decision tree shows the following activities:

1. **Studying for/attending exams**: When two students are located in a DTU building in May or December, they are either studying for an exam or attending one. Students attending the same exam don't necessarily know each other, but students studying together for their exams have a stronger relation than just being acquaintances. Knowing a student's list of courses and exam dates will help to determine whether the student is studying for an exam or attending one.

2. **Attending lecture**: When there aren't exams, the first activity two students can be doing is attending a course lecture. Knowing the DTU building the two students are located in and the time, this activity can be determined using their DTU calendar. Two students attending the same lecture doesn't necessarily mean that they know each other, but it still connects them due to similar choice of course.

3. **Doing exercises**: The second activity is attending course exercise class, where the students do exercises together. Again this can be determined from the calendar. Working together connects the students more compared to the lectures, because they get to know each other on a personal level. Furthermore they may want to work with each other in the future, if their group work is a success.

4. **Eating lunch**: The students may be eating lunch between 12:00-13:00. Two students eating lunch together is a strong indication of them being socially related.

5. **Attending dance class**: After lunch, when there isn't either a lecture or an exercise class, the students may be doing something in their spare time. If they are located in building 208 in the evening they might be attending a dance class. Since this partly is a social event, it is likely that all the participants of the class develop a social relation beyond just being acquaintances. Some might even become friends.

6. **At Friday bar with friends**: A second activity the students may be doing in their spare time is going to one of the Friday bars at DTU, which are located in the buildings 116, 414 and 342. This is a social event and students go there to socialize. This means that two students being there together most likely will become friends, or will strengthen their friendship if they already are friends.

7. **Project work, homework etc.**: When the students aren't in any of the aforementioned situations, they may be doing project work, homework or something similar. Similar to the exercise classes this strengthens their social relation. But this activity may strengthen their relation more than exercise classes. When doing homework the students themselves choose

whom they work with and when they do it, whereas the fixed exercise classes may get them to attend class and work in groups there.

Some of the activities require that the two students are together in order for their relation to be strengthened. Determining if two students are actually together may be difficult, because the location data only can tell which building they are in. Two students can be in the same building but at opposite ends. Therefore a possible solution to this problem is to include **Bluetooth data**, which is also fetched by SensibleDTU. The range of Bluetooth is typically around 10 meters. This means that the Bluetooth scans of one student can be used to determine whether the other student was within a distance of 10 meters, which is far more precise than the location data.

In the example from the decision tree student information, such as the calendar, has been used to further describe what two students are doing in addition to the location and time labels. Other student information could also have been used:

- The **education programme and studyline** of the students help to understand their interests and preferred courses. Two students, who are both studying Digital Media Engineering and are choosing the same courses, are likely to become friends or better friends.
- The **learning objectives** for a course can be interpreted as the competences a student acquires after passing the course. A list of passed courses of a student can be used to create a professional profile, which describes the student in terms of strengths and interests. People with the same competences tend to be similar, which is an indication of a strong or potentially strong relation.
- **Grades from courses and projects** can be used. Two students getting a good grade for their project, may work together again, because of the success in their teamwork. Getting a bad grade may part them in future work and thereby decrease the strength of their relation.

Depending on the choice of network, **graph theory** can be used in addition to location data to quantify the relations. **Distance** can be used to define how well two people know each other. If the network is created from Facebook friendships, a friend on Facebook is in distance 1, his friends in distance 2 etc. But if the network is based on who worked together in exercises and projects, a partner from a past project is in distance 1, his past partners in distance 2 etc. Both can be used to quantify social relations. **Strong triadic closure** can be used on the last mentioned network to learn more about relations. Two people

who don't know each other, but have good past experiences from working with the same person, may also get to work with each other in the future. This is an indication of a potential relation between those two people.

The decision tree in figure 6.1 isn't complete, because it only describes the activities when located at DTU. To complete the tree the remaining areas in one's life also have to be included: home, work, spare time etc. But it is the first step in reaching the next goal, which is being able to determine people's activities in all situations and use this to quantify their social relations. Being able to learn people's activities and behaviour may also introduce new features, which satisfy new undiscovered user needs. An example can be that a student wants to know which of his fellow students he should choose as his next project partner, where there is the greatest chance of successful teamwork. A possible feature for this is to show their past partners they have in common and how successful the partnerships were. The latter could be shown in the form of grades from past work. These new features should then be tested in a new iteration in order to validate the existence of the needs and that the features add value to the users. Furthermore the test will answer how important the new features are, and if they should replace existing features.

Chapter 7

Conclusion

The main goal of this thesis was to create a user experience design for a mobile application, which uses social relations quantified by social and location data, in order to satisfy user needs related to maintaining, strengthening and possibly creating new relations.

In order to reach that goal the related work was investigated. This answered that there is an advantage in quantifying social relations and that it isn't done in current social networking sites e.g. Facebook. Furthermore it opened the possibility for quantifying social relations based on Facebook data and location data from the SensibleDTU database.

An analysis of the user and user needs based on the research introduced three use cases, which were the foundation of the first prototypes. Testing the prototypes on test-users iteratively until they needed no major changes yielded the following set of features that **visualizes quantified social relations** in order to satisfy the user needs.

The first feature is the **Map view**, which shows the user's friends placed on a map according to their physical location. The second feature **Nearby friends view** shows the friends in the user's vicinity. The third feature **Network view** shows the friends in the user's network and how closely he is related to them. The fourth feature **Favourite places view** shows the favourite places of the

user's friends, where the user can see which friends go there and when they generally prefer to go there. These four features help the user to get an **overview of his quantified social relations and their behaviour**.

The fifth feature is the **Profile view**, where the user can view information on a friend. This information includes relation strength, work, education, interests, favourite places and common friends. The user can use this information to learn about the friend and how important he is to the user. If the user wants to **maintain or strengthen the relation** with a friend the following four features will be of help. The user can **locate the friend** to find him immediately or see his **favourite places** to learn where he generally can be found. A **common friend**, who is good friends with both the user and the other friend, may be a help in connecting the user and the other friend. Finally the user can **contact the friend** either by phone call or messaging.

After exploring the different options for implementing the aforementioned features, a front-end implementation of the features was done. The implementation and its features form the **user experience design for quantifying social relations based on Facebook data and location data**. Thus it can be concluded that the goal of the thesis is reached.

Appendix A

1. iteration interview

A.1 Test P1

Questions

1. Where do you find/view your social network?

Facebook, LinkedIn

2. How do you find information regarding your social relations?
    a. The strength of the relations?

Facebook og LinkedIn

    b. The preferred places?

Not available

Only through invited events

    c. Where you can meet your friends and acquaintances in order to strengthen the bond with them?

None

    d. Who of your good friends you can contact, who is also a good friend of the person you want to strengthen your bond with? This means who of your friends is a connection between you and the weak relation?

LinkedIn – else none

3. How do you find out, how your relations behave?
    a. Where your friends are located now or where they typically are located?

Write him or contact – else not

    b. Where you can go in order to strengthen the bond with your friends and acquaintances?
    c. Where you can go in order to meet new people and possibly get new friends?

    d. Which social groups you friends and acquaintances form?

LinkedIn when professional groups

Else not

    e. Through whom you are connected to the groups?

    f. How the bond to the groups can be strengthened?

Social groups

Description: You have a social network and the app shows an overview of the social groups in your social network.

Tasks:

You want to strengthen your relations with the people in the social groups. You open the app, which identifies three groups.

1. Choose the biggest social group. Do you have any weak relations to the people in this group? If yes, who?
2. Where do the people from this group prefer to go?
3. When do they go to this place? Is there any pattern?
4. How many relations have been strengthened at this place?

You want to go to this place in order to strengthen your relations in this group and potentially create new relations.

5. Find a good friend of yours, who is also a part of this group, and call him in order to join him the next time he goes to the place.

Feedback:

POI=Map

Links det same som people. Kan ikke se forskel

Kan se de er venner. Har relation på 85 %

History forstås ikke ud fra tab

Man skal kunne gå tilbage til hovedskærmen

Når der zoomes ind skal 3 i højre side ikke være markeret

Man er inde på hovedskærmen og zoomer ind på en gruppe. Derefter vil man gerne se hvordan man nemt kan styrke sin relation til en person man ikke kender i forvejen. Der vil det være godt at se hvem der forbinder en bedst til den person man gerne vil lære at kende. Det samme som i Links, bare for hver enkelt person.

Det ville være lidt smartere at kunne slå to fluer med ét smæk hvis man kunne se POI for flere grupper ad gangen i stedet for man først skal se for den ene gruppe og derefter gå tilbage, vælge den anden og se for den. POI skal være samlet for hele netværket, og derefter kan man trykke på noget aktivitet på spiralen for at se, hvilke grupper aktiviteten kommer fra.

Når du trykker på en person du ikke kender, så er det vigtigt at vide hvem der er de bedste links af mine venner ud til ham. Dette kunne vises på profilsiden.

Links skal smides ud og integreres i People, så de første der bliver vist er dine venner, hvor venskabsstatus også er angivet i listen.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?
5.

Strong and weak relations

Description: You have a social network and the app helps to get an overview of your social relations and how they change in time.

Tasks:

You want to see how your relations look today, so you open the app which shows a graph of your relations to your friends.

1. Filter the graph, so it only shows the strong relations.
2. One of the strongest relations is Jake. What is the place/POI where you and Jake spend the most time together?
3. Find out what Jack does for living.

Now you want to see how your relations have changed over time up until today.

4. Play the animation showing the change of all the relations together.
5. Go back and choose Jake.
6. Again, play the animation showing the change of the relation with Jake. In which order are the three preferred places/POIs of you and Jake placed in the beginning and in the end?

Feedback:

When you can filter why can't you search for a specific person/relation? It would be nice to be able to search after tapping filter.

Jake 85% what??

Has been in the PF Café with Jake 1 day ago Or he alone has been there 1 day ago??? 60%??

POI is better than shared POI. You don't need to know where you have been together with Jake, but only where Jake prefers to go.

For living: Wants to click on Jake head icon, but doesn't work. Then on personal

Date and time too small. Doesn't understand that it is a button that should be tapped.

When animation played it could be nice to see not only the date and time, but also where you have been so you can see which places have triggered a change in relations. Maybe pause the animation and tap to see more details.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?

4. Could anything be showed in another way?

Map

Description: You have a social network and the app helps to get an overview of where your relations are located.

Tasks:

You are done with your lectures for today and want to see where the people from your social network are. You open the app, which shows a map with the people placed on it.

1. Identify the biggest group of people and zoom in on the group in order to see it more detailed.
2. Filter the map so it only shows the relations above 85% strength.
3. Zoom in again.
4. Tap on the “S-huset”-label in order to see who are present at the place.
5. Choose Jake and navigate to him.

The next day after school you want to see who from your network are nearby.

1. How far is Jake away from you?
2. Again choose Jake and navigate to him.

Feedback:

Taps on >80%, misunderstood

Hard to filter on %. Better with strong, weak etc.

Jake profile needs to be filled out with info. Is empty now

List tap isn’t self-explanatory. Need another name. Maybe Friends near

This concept is good that it helps you to find people that you can meet right now and strengthen your bond with.

Color coding misunderstood. Thought that the lighter color was the stronger relations and darker was weaker. This would be better

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Appendix B

2. iteration interview

B.1 Test P1

Questions

1. Where do you find/view your social network?
   Facebook on computer but mostly mobile.
2. How do you find information regarding your social relations?
   Mostly what you yourself think/know. All friends are on Facebook. The stronger relations are on Skype.
   a. The strength of the relations?
   b. The preferred places?
   c. Where you can meet your friends and acquaintances in order to strengthen the bond with them?
   d. Who of your good friends you can contact, who is also a good friend of the person you want to strengthen your bond with? This means who of your friends is a connection between you and the weak relation?
3. How do you find out, how your relations behave?
   a. Where your friends are located now or where they typically are located?
      Call the friends and ask. Otherwise no way to tell
   b. Where you can go in order to strengthen the bond with your friends and acquaintances?
   c. Where you can go in order to meet new people and possibly get new friends?
   d. Which social groups you friends and acquaintances form?
   e. Through whom you are connected to the groups?
   f. How the bond to the groups can be strengthened?

Answers:

Social groups

Description: You have a social network and the app shows an overview of your social network and its social groups.

Tasks:

You want to strengthen your relations with the people in the social groups. You open the app, which identifies three groups.

1. Choose the biggest social group “Group 3”. Find Joe. Are you friends with him?
2. How strong is the bond between you and Joe?
3. Who of your friends are the best links to Joe?
4. Write to one of them, who can help you strengthen the bond with Joe.
5. Who of your friends are the best links to the group “Group 3”? Who can help strengthen the bonds?
6. Call one of them, who can help you strengthen the bond with “Group 3”.

7. Where do the people from your social network prefer to go?
8. When do they go to this place? Is there any pattern?
9. Who of them are from “Group 3”?

Feedback:

No “Search” field

Had trouble finding the links to the whole group (Group 3)

The name POI wasn’t understood. It was only chosen because it was the other tab.

User suggests that Profile-images are shown in the network-graph. It is easier to get an overview of the people in the network by looking at images, since it is easier to remember faces than names. Especially when it is people who aren’t your own friends, but maybe your friends’ friends.

This concept is relevant in the university, since you as a university-student generally have a big focus on having a social network and a social life. This is especially important for new students, who are new to the university life. They would like to know the “popular” places at the university and go there to hopefully create new friendships and strengthen the bonds they already have.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?

4. Could anything be showed in another way?

Strong and weak relations

Description: You have a social network and the app helps to get an overview of your social relations and how they change in time.

Tasks:

You want to see how your relations look today, so you open the app which shows a graph of your relations to your friends.

1. Who are your stronger relations?
2. One of the strongest relations is Jake. Where does Jake prefer to go?
3. Find out what Jack does for living.

Now you want to see how your relations have changed over time up until today.

4. Play the animation showing the change of all the relations in the last week.
5. Which changes occur?
6. Which places trigger these changes?
7. Go back and choose Jake.
8. Again, play the animation showing the change of the relation with Jake. Does the preferred places/POIs of you and Jake change?

Feedback:

In Jake's profile, what does "Relation" mean?

When a new relation is created in the animation, it would be nice to see through which existing relation the new relation was created. If you already were friends with A, and you through A get to know B, this should be understood from the animation.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Map

Description: You have a social network and the app helps to get an overview of where your relations are located.

Tasks:

You are done with your lectures for today and want to see where the people from your social network are. You open the app, which shows a map with the people placed on it.

1. Identify the biggest group of people and zoom in on the group in order to see it more detailed.
2. Filter the map so it only shows the strong relations.
3. Zoom in again.
4. Tap on the “S-huset”-label in order to see who are present at the place.
5. Navigate to “S-huset”.

The next day after school you want to see who from your network are nearby.

1. How far is Jake away from you?
2. Again choose Jake and navigate to him.

Feedback:

After filtering the map profile-images should be shown as the persons.

It isn’t clear that you can tap on “S-huset”

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

B.2 Test P2

Questions

1. Where do you find/view your social network?
2. How do you find information regarding your social relations?
    a. The strength of the relations?
    b. The preferred places?
    c. Where you can meet your friends and acquaintances in order to strengthen the bond with them?
    d. Who of your good friends you can contact, who is also a good friend of the person you want to strengthen your bond with? This means who of your friends is a connection between you and the weak relation?
3. How do you find out, how your relations behave?
    a. Where your friends are located now or where they typically are located?
    b. Where you can go in order to strengthen the bond with your friends and acquaintances?
    c. Where you can go in order to meet new people and possibly get new friends?
    d. Which social groups you friends and acquaintances form?
    e. Through whom you are connected to the groups?
    f. How the bond to the groups can be strengthened?

Answers:

Social groups

Description: You have a social network and the app shows an overview of your social network and its social groups.

Tasks:

You want to strengthen your relations with the people in the social groups. You open the app, which identifies three groups.

1. Choose the biggest social group “Group 3”. Find Joe. Are you friends with him?
2. How strong is the bond between you and Joe?
3. Who of your friends are the best links to Joe?
4. Write to one of them, who can help you strengthen the bond with Joe.
5. Who of your friends are the best links to the group “Group 3”? Who can help strengthen the bonds?
6. Call one of them, who can help you strengthen the bond with “Group 3”.

7. Where do the people from your social network prefer to go?
8. When do they go to this place? Is there any pattern?
9. Who of them are from “Group 3”?

Feedback:

GPS is not enough to measure a social relation. It should include common interests such as music and common friends. Maybe use network degree to measure a relation.

Percentile (%) is a bad choice to display a quantified relation. What does 85% mean? How strong is the relation then? 85% indicates you miss something since it isn’t 100% yet. Better to use colors to show relation strength.

The network graph should at maximum go up to the second degree of friends. This means your friends and your friends’ friends. A higher degree will result in a too crowded graph. People, who are in a degree of 3 or higher, are people who you don’t know, but more importantly people where there isn’t a probability for you to become friends with them.

An idea suggested from the user is that the people, who are showed in the graph, should be limited to friends and people, where there is a probability of friendship. This probability could be measured on some parameters.

An example parameter: See which common interests you have with a friend. If you share the same interests with another person, this person is a potential friend.

POI hard to understand

Spiral should be limited to a month

Also mark when you yourself have been there on the spiral. This will help to see if you have been there the same time as the people from your network have. If you have, this indicates that you and these people share interests and favorite places.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Strong and weak relations

Description: You have a social network and the app helps to get an overview of your social relations and how they change in time.

Tasks:

You want to see how your relations look today, so you open the app which shows a graph of your relations to your friends.

1. Who are your stronger relations?
2. One of the strongest relations is Jake. Where does Jake prefer to go?
3. Find out what Jack does for living.

Now you want to see how your relations have changed over time up until today.

4. Play the animation showing the change of all the relations in the last week.
5. Which changes occur?
6. Which places trigger these changes?
7. Go back and choose Jake.
8. Again, play the animation showing the change of the relation with Jake. Does the preferred places/POIs of you and Jake change?

Feedback:

Jake personal: Add interests

Jake relation: Add common friends

POI? Better to use “Place/Point of interest”

“Relation” not understood. Needs better name.

After tapping “Personal” he thinks “Relation” is a third page, when it actually lets the user return to the previous page. Maybe it should be showed as tabs, where you can see what is tapped and what page you are currently on.

The icon of the second tab isn’t understood. Suggestion is to use a green arrow pointing up and a red arrow pointing down.

Don’t use colors from green to red. Use only green from light to dark.

Animation for whole network shouldn’t show place that triggers a change, since this can be multiple places at the same time.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?

3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Map

Description: You have a social network and the app helps to get an overview of where your relations are located.

Tasks:

You are done with your lectures for today and want to see where the people from your social network are. You open the app, which shows a map with the people placed on it.

1. Identify the biggest group of people and zoom in on the group in order to see it more detailed.
2. Filter the map so it only shows the strong relations.
3. Zoom in again.
4. Tap on the “S-huset”-label in order to see who are present at the place.
5. Navigate to “S-huset”.

The next day after school you want to see who from your network are nearby.

1. How far is Jake away from you?
2. Again choose Jake and navigate to him.

Feedback:

When fully zoomed show images

People have to accept that other users know where they are and can find them. All people don’t always want others to know where they are.

Nearby friends represented as radar. Persons are represented as images surrounded by circles with color or size of relation. User is in the center and nearby friends are around him.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

B.3 Test P3

Questions

1. Where do you find/view your social network?
2. How do you find information regarding your social relations?
    a. The strength of the relations?
    b. The preferred places?
    c. Where you can meet your friends and acquaintances in order to strengthen the bond with them?
    d. Who of your good friends you can contact, who is also a good friend of the person you want to strengthen your bond with? This means who of your friends is a connection between you and the weak relation?
3. How do you find out, how your relations behave?
    a. Where your friends are located now or where they typically are located?
    b. Where you can go in order to strengthen the bond with your friends and acquaintances?
    c. Where you can go in order to meet new people and possibly get new friends?
    d. Which social groups you friends and acquaintances form?
    e. Through whom you are connected to the groups?
    f. How the bond to the groups can be strengthened?

Answers:

Social groups

Description: You have a social network and the app shows an overview of your social network and its social groups.

Tasks:

You want to strengthen your relations with the people in the social groups. You open the app, which identifies three groups.

1. Choose the biggest social group “Group 3”. Find Joe. Are you friends with him?
2. How strong is the bond between you and Joe?
3. Who of your friends are the best links to Joe?
4. Write to one of them, who can help you strengthen the bond with Joe.
5. Who of your friends are the best links to the group “Group 3”? Who can help strengthen the bonds?
6. Call one of them, who can help you strengthen the bond with “Group 3”.

7. Where do the people from your social network prefer to go?
8. When do they go to this place? Is there any pattern?
9. Who of them are from “Group 3”?

Feedback:

In links under profile of Joe it’s hard to understand the order of the persons. Who is the best link, the next best link etc. Color on the left for each link-person should indicate how good links they are instead of the relation strength.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Strong and weak relations

Description: You have a social network and the app helps to get an overview of your social relations and how they change in time.

Tasks:

You want to see how your relations look today, so you open the app which shows a graph of your relations to your friends.

1. Who are your stronger relations?
2. One of the strongest relations is Jake. Where does Jake prefer to go?
3. Find out what Jack does for living.

Now you want to see how your relations have changed over time up until today.

4. Play the animation showing the change of all the relations in the last week.
5. Which changes occur?
6. Which places trigger these changes?
7. Go back and choose Jake.
8. Again, play the animation showing the change of the relation with Jake. Does the preferred places/POIs of you and Jake change?

Feedback:

On relation strength bar in the profile there should be a title describing what the bar shows.

If tapped on a weak relation/person, the links to the person should be shown as in “Social groups”.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Map

Description: You have a social network and the app helps to get an overview of where your relations are located.

Tasks:

You are done with your lectures for today and want to see where the people from your social network are. You open the app, which shows a map with the people placed on it.

1. Identify the biggest group of people and zoom in on the group in order to see it more detailed.
2. Filter the map so it only shows the strong relations.
3. Zoom in again.
4. Tap on the “S-huset”-label in order to see who are present at the place.
5. Navigate to “S-huset”.

The next day after school you want to see who from your network are nearby.

1. How far is Jake away from you?
2. Again choose Jake and navigate to him.

Feedback:

It would be better to see the faces when zooming-in in addition to the name. Then you don’t have to tap on each person to see who they are, if you don’t remember the name. And faces are easier to remember.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Appendix C

3. iteration interview

C.1 Test P1

Relations

Description: You have a social network and the app helps to get an overview of your social relations.

Tasks:

You want to see how your relations look today, so you open the app which shows a graph of your relations to your friends.

1. Who are your stronger relations?
2. One of the weakest relations is Joe. Where does Joe prefer to go?
3. Find out what Joe does for living.

You want to strengthen your bond with Joe.

4. Find a person who is a good link between you and Joe, who can help you, and write to him.
5. Where do you and your relations generally prefer to go?
6. When do you there?

Feedback:

He thinks that the favourite places are where the user has been, but it is supposed to be the “popular” places of all the people in the network. And if the user himself also has been there, this will be marked with a smiley.

There should be something explaining the colours and smileys, since it can’t be guessed. The user suggests labels/legends, “info”-button or a first time guide, where the user can see what they mean.

Hard to see what can be tapped and what cannot. Can the days on the spiral be tapped to see more? The user should be able to pinch-zoom on the spiral to enlarge it.

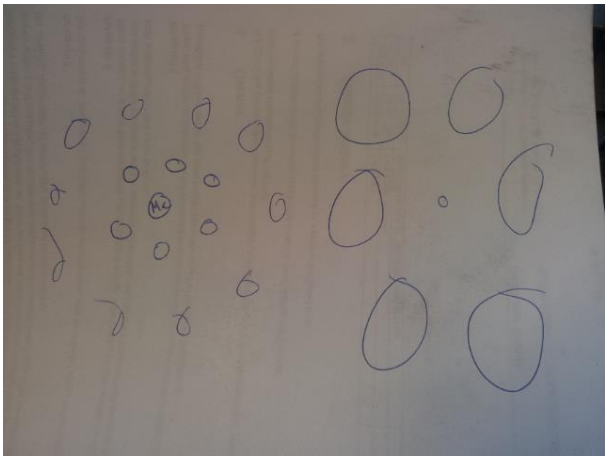
It is nice with common friends.

“Links” is a bad name. Maybe use “Strongest links” or “Best links”.

Interests should be moved to the “About”-tab.

It is nice with swiping to see the other favourite places.

The colours of the network graph should be changed. The white background of the graph disturbs the dark/black theme used throughout the prototype.



The network graph should be replaced with this type of graph. The user is in the centre and people are around him. People in the first inner circle are the best friends of the user; the people in the next outer circle are lesser known friends and so on.

Strong and weak isn't understood. Maybe one should use "good" friends, "acquaintances" etc.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Map

Description: You have a social network and the app helps to get an overview of where your relations are located.

Tasks:

You are done with your lectures for today and want to see where the people from your social network are. You open the app, which shows a map with the people placed on it.

1. Identify the biggest group of people and zoom in on the group in order to see it more detailed.
2. Filter the map so it only shows the strong relations.
3. Zoom in again.
4. Navigate to “S-huset”.

The next day after school you want to see who from your network are nearby.

1. How far is Jake away from you?
2. Navigate to Jake.

Feedback:

First the map shows the different groups around campus. When zooming in it shows the individual persons as dots. After zooming in once more the profile images of the people are shown. The second step is unnecessary and should be omitted, so the user goes straight from the groups to the images.

It requires a bit too many interactions to see who are at S-huset.

The user should be able to filter from the beginning on the map, and not only after zooming in.

There should be names on the radar. Not always that you remember a face. Sometimes the image is unclear or shows something else than the person.

The radar is nice and smart.

He wants a mix of the two prototypes. He thinks “Map” is too little in functionality. But both have interesting functionalities.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

C.2 Test P2

Relations

Description: You have a social network and the app helps to get an overview of your social relations.

Tasks:

You want to see how your relations look today, so you open the app which shows a graph of your relations to your friends.

1. Who are your stronger relations?
2. One of the weakest relations is Joe. Where does Joe prefer to go?
3. Find out what Joe does for living.

You want to strengthen your bond with Joe.

4. Find a person who is a good link between you and Joe, who can help you, and write to him.
5. Where do you and your relations generally prefer to go?
6. When do you there?

Feedback:

When finding the good links to Joe, he uses the common friends in the “About”-tab. He taps on Jake, sees he has a strong relation to him and then concludes that Jake is a good link. This could be easily seen under the “Links”-tab, but wasn’t understood by the user. The user suggests that “Links” is renamed to “Common friends” and contains the common friends, where you can see the best links first.

“About” should contain the user’s interests and not “Favourites”. The interests should be represented by images instead of text. Use expandable list for the interests, where each item has a category name, which can be expanded giving the images of the interests in that category.

The colours of the network graph should be changed, so they match the theme of the prototype. It would be nice if one was able to pinch-zoom on the graph, which would make the graph more interactive.

The smiley wasn’t understood before explanation. The smiley should maybe be replaced with something that more clearly indicates that the user has been there. The user suggests that a list or labels should be displayed which indicates what the icons and colours represent.

Easy to see pattern in when people are at the place, such as every second Wednesday.

It is a nice feature that you can swipe to see the other favourite places.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?

    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Map

Description: You have a social network and the app helps to get an overview of where your relations are located.

Tasks:

You are done with your lectures for today and want to see where the people from your social network are. You open the app, which shows a map with the people placed on it.

1. Identify the biggest group of people and zoom in on the group in order to see it more detailed.
2. Filter the map so it only shows the strong relations.
3. Zoom in again.
4. Navigate to “S-huset”.

The next day after school you want to see who from your network are nearby.

1. How far is Jake away from you?
2. Navigate to Jake.

Feedback:

He doesn’t remember who Jake is on the radar. In addition to the image a name should therefore also be displayed. Another reason for this is that some people have unclear images or images of something else than themselves, which results in the user not being able to recognize who it is.

The distance should be specified directly on the radar circle instead of above each person, since having both the name and the distance displayed for each person will take up too much of the screen.

The user thinks that only people in a 500m radius should be displayed.

The user suggests showing the nearby friends as a list ordered by distance, where an arrow is shown for each person pointing in their direction. Here the people in a radius of 500m can be shown first, and if the user wants to see more, he can tap on a button or scroll down, which will add more to the list.

Maybe the user should be able to switch between the list and the radar, but user thinks that the list is the better choice.

When tapping on Jake on the radar it is nice that you can see where he is on the map.

Map is the better of the two prototypes, since it helps the user right now.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?

    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

C.3 Test P3

Relations

Description: You have a social network and the app helps to get an overview of your social relations.

Tasks:

You want to see how your relations look today, so you open the app which shows a graph of your relations to your friends.

1. Who are your stronger relations?
2. One of the weakest relations is Joe. Where does Joe prefer to go?
3. Find out what Joe does for living.

You want to strengthen your bond with Joe.

4. Find a person who is a good link between you and Joe, who can help you, and write to him.
5. Where do you and your relations generally prefer to go?
6. When do you there?

Feedback:

Tries to scroll down on ”About” in order to see favourite places. “Favourites” name isn’t understood.

Doesn’t understand colors on spiral. Colors could represent how many people have been there.

Doesn’t understand the smiley icon on the spiral indicating the user has been there. Couldn’t guess what the smiley meant.

User suggests legends or an “info”-button explaining the different representations.

Interests should be in the “About” tab and not under “Favourites”. And “Favourites” should only contain the favourite places and maybe some info about the places.

“Links” a bad name. Change it to something that indicates that your can build or strengthen your relation.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

Map

Description: You have a social network and the app helps to get an overview of where your relations are located.

Tasks:

You are done with your lectures for today and want to see where the people from your social network are. You open the app, which shows a map with the people placed on it.

1. Identify the biggest group of people and zoom in on the group in order to see it more detailed.
2. Filter the map so it only shows the strong relations.
3. Zoom in again.
4. Navigate to “S-huset”.

The next day after school you want to see who from your network are nearby.

1. How far is Jake away from you?
2. Navigate to Jake.

Feedback:

“Me” shouldn’t be black, since roads and other things on the map also are black, which makes the “Me” dot unclear.

After zooming in on the biggest group of people, individual persons are supposed to be shown as separate dots with the color representing their relation strength with the user. The user thinks that the dots are several smaller groups of people. When zooming in the images of the people should be shown immediately.

On radar the user doesn’t remember, which of the images Jake is. The name should also be displayed.

User doesn’t fully understand the idea with the radar and feels that there should be something easier that indicates how far away the friends are. He thinks that the sizes indicate the distance. Maybe the distances should be displayed on the radar itself and not above each person.

Map is the best prototype, since it helps the user right away.

Questions:

1. Is everything self-explanatory?
2. Is anything missing?
    a. What?
3. Is anything not necessary?
    a. Why not necessary? Because of lack of understanding or simply not needed?
4. Could anything be showed in another way?

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