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Scheduling of Ambulant Nursing Staff

Ambulant nursing, i.e. visiting and nursing patients at their homes, is a strongly growing sector in the medical service business. More and more private companies are working in this area. As the nursing companies are getting larger, the problem arises of how to schedule the nursing staff. The challenge of this problem is to combine aspects of vehicle routing and staff rostering. Both are well known combinatorial optimization problems. To obtain cost optimal solutions, however, it is crucial to solve the nurse scheduling problem as a whole due to the high interdependencies of optimized routes and the constraints from the rostering. Rostering constraint include hard ones like qualification requirements or work time limitations, and soft ones. Especially soft constraints are difficult to model, but have to be considered for applicable schedules. Examples for typically soft constraints are:

- patients do not like frequent changes of nursing staff
- the right 'chemistry' between patients and staff has to be ensured
- staff satisfaction concerning e.g. work load and work time should be maximized

The vehicle routing part of the problem has to respect time windows and maintenance constraints, and inhomogeneous fleets (bicycles, public transport, cars).

The goal of the PARPAP project is to model this problem and to develop suitable algorithms for finding good rosters respecting all hard and soft constraints mentioned above.

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