

# The IMM Face Database

## An Annotated Dataset of 240 Face Images

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(Stevie Wonders 54th birthday)

### Abstract

This note describes a dataset consisting of 240 annotated monocular images of 40 different human faces. Points of correspondence are placed on each image so the dataset can be readily used for building statistical models of shape. Format specifications and terms of use are also given in this note.

**Keywords:** annotated image dataset, face images, statistical models of shape

## 1 Data Description

The IMM Face Database comprises 240 still images of 40 different human faces, all without glasses. The gender distribution is 7 females and 33 males. Images were acquired in January 2001 using a 640×480 JPEG format with a Sony DV video camera, DCR-TRV900E PAL. The following facial structures were manually annotated using 58 landmarks: eyebrows, eyes, nose, mouth and jaw. A total of seven point paths were used; three closed and four open. All annotations were formatted in ASF, which is described in Appendix A. Refer to Figure 1 for an example annotation.

The file names are formatted as <person number>-<image type><gender>.

- **Image types**

- 1 Full frontal face, neutral expression, diffuse light.
- 2 Full frontal face, "happy" expression, diffuse light.
- 3 Face rotated approx. 30 degrees to the person's right, neutral expression, diffuse light.
- 4 Face rotated approx. 30 degrees to the person's left, neutral expression, diffuse light.
- 5 Full frontal face, neutral expression, spot light added at the person's left side.
- 6 Full frontal face, "joker image" (arbitrary expression), diffuse light.

- **Gender**

- f female
- m male

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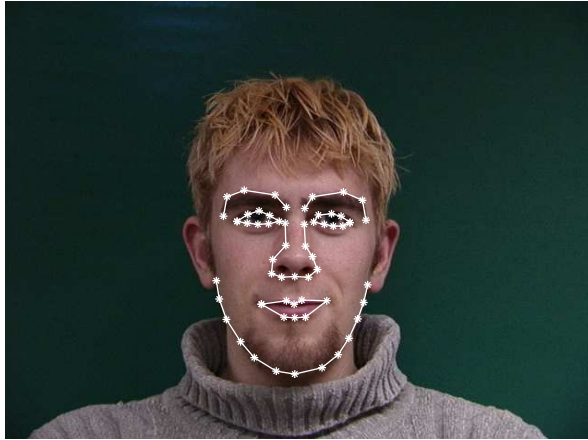


Figure 1: Annotated face image.

**Important notice:** We don't quite know how it happened, but it appears as if gnomes have infected our database and converted person 02, 03, and 04 to grey-scale. Sorry.

The publications [3] and [2] contain detailed analyses of a subset of the database containing 37 images (full frontal, neutral expression, colour). See also [1] for an interactive demonstration of the modes of variation discovered in a similar subset.

## 2 Terms of Use

The dataset can be freely used for education and research. The only requirement is that a reference to this note or the publication below must be given.

M. B. Stegmann, B. K. Ersbøll, and R. Larsen. FAME – a flexible appearance modelling environment. *IEEE Trans. on Medical Imaging*, 22(10):1319–1331, 2003

```
@ARTICLE{Stegmann2003tmi,
  author      = "M. B. Stegmann and B. K. Ersb{\o}ll and R. Larsen",
  title       = "{FAME} -- A Flexible Appearance Modelling Environment",
  year        = "2003",
  pages       = "1319-1331",
  journal     = "IEEE Trans. on Medical Imaging",
  volume      = "22",
  number      = "10",
  publisher   = "IEEE"
}
```

## References

- [1] M. B. Stegmann. The AAM Explorer, December 2001. Software that can be downloaded from <http://www.imm.dtu.dk/~aam/aamexplorer/>.
- [2] M. B. Stegmann. Analysis and segmentation of face images using point annotations and linear subspace techniques. Technical Report IMM-REP-2002-22, Informatics and Mathematical Modelling, Technical University of Denmark, DTU, aug 2002.
- [3] M. B. Stegmann, B. K. Ersbøll, and R. Larsen. FAME – a flexible appearance modelling environment. *IEEE Trans. on Medical Imaging*, 22(10):1319–1331, 2003.

## A ASF – AAM Shape Format Specification

An ASF file is structured as a set of lines separated by a CR character. Anywhere in the file, comments can be added by starting a line with the '#' character. Comment lines and empty lines are discarded prior to parsing. The layout of an ASF file is as follows:

- Line 1 contains the total number of points,  $n$ , in the shape.
- Line 2 to  $n+1$  contains the point information (one line per point) such as the point location, type, connectivity etc., see below. Hence, quick and simple access is preferred over data compactness.
- Line  $n+2$  contains the *host image*, i.e. the filename of the image where the annotation is defined.

The formal point definition is:

```
point := <path#> <type> <x-pos> <y-pos> <point#> <connects from> <connects to>
```

<path#> The path that the point belongs to. Points from different paths must not be interchanged (in the line order).

<type> A bitmapped field that defines the type of point:

- Bit 1: Outer edge point/Inside point
- Bit 2: Original annotated point/Artificial point
- Bit 3: Closed path point/Open path point
- Bit 4: Non-hole/Hole point

Remaining bits should be set to zero. An inside artificial point which is a part of an closed hole, has thus the type:  $(1 \ll 1) + (1 \ll 2) + (1 \ll 4) = 1 + 2 + 4 = 7$ .

<x-pos> The relative x-position of the point. Obtained by dividing image coordinates in the range [0;image width-1] by the image width (due to strange historic reasons...). Thus, pixel  $x = 47$  (the 48th pixel) in a 256 pixel wide image has the relative position  $47/256 = 0.18359375$ .

<y-pos> The relative y-position of the point. Obtained by dividing image coordinates in the range [0;image height-1] by the image height (due to strange historic reasons...). Thus, pixel  $y = 47$  (the 48th pixel) in a 256 pixel tall image has the relative position  $47/256 = 0.18359375$ .

<point#> The point number. First point is zero. This is merely a service to the human reader since the line at where the point occurs implicitly gives the real point number.

<connects from> The previous point on this path. If none <connects from> == <point#> can be used.

<connects to> The next point on this path. If none <connects to> == <point#> can be used.

Further, the following format rules apply:

- Fields in a point specification are separated by spaces or tabs.
- Path points are assumed to be defined clockwise. That is; the outside normal is defined to be on left of the point in the clockwise direction. Holes are thus defined counter-clockwise.
- Points are defined in the fourth quadrant. Hence, the upper left corner pixel is (0,0).
- Isolated points are signaled using <connects from> == <connects to> == <point#>.
- A shape must have at least one outer edge. If the outer edge is open, the convex hull should determine the interior of the shape.

## Example ASF file

```
<BOF>
#####
#
#   AAM Shape File - written: Monday May 08 - 2000 [15:22]
#
#####

#
# number of model points
#
83

#
# model points
#
# format: <path#> <type> <x rel.> <y rel.> <point#> <connects from> <connects to>
#
0 0 0.07690192 0.44500541 0 82 1
0 0 0.09916206 0.42914406 1 0 2
0 0 0.12925033 0.39573063 2 1 3

...

0 0 0.07579006 0.52910086 80 79 81
0 0 0.06128729 0.49762829 81 80 82
0 0 0.05858913 0.46610570 82 81 0

#
# host image
#
F1011flb.bmp

<EOF>
```