An Annotated Dataset of 14 Meat Images

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Abstract

This note describes a dataset consisting of 14 annotated images of meat. Points of correspondence are placed on each image. As such, the dataset can be readily used for building statistical models of shape. Further, format specifications and terms of use are given.

Keywords: annotated image dataset, meat, statistical models of shape

1 Data Description

The data consists of 14 gray scale images (768×576 pixels) in the BMP file format. Each image is annotated using 83 points of correspondence, which are formatted in ASF format (see appendix). An example image is shown in figure 1.

Images were acquired by Schultz [3] and later segmented using the Active Appearance Model (AAM) [2, 1] by Stegmann [5]. For a brief summary of the AAM segmentation results, refer to [4][1].

2 Terms of Use

The dataset can be freely used for education and research. The orginal provider *The Danish Meat Research Institute* must be credited, e.g. under Acknowledgements. Further, a reference to this note or [4] / [5] should be given.

3 Acknowledgements

Dr. Hans Henrik Thodberg, Danish Meat Research Institute, provided the meat and Dr. Nette Schultz recorded the images. Dr. Rune Fisker and Dr. Nicolae Duta supplied and brought the annotations into correspondence.

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[1] Can be downloaded from http://www.imm.dtu.dk/~mbs/

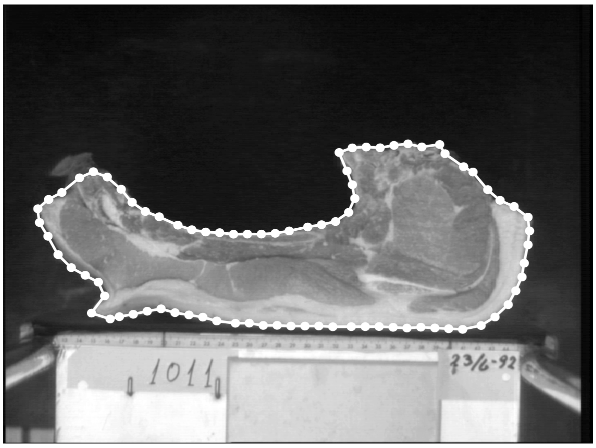

Figure 1: Annotated meat image.

References

[1] T. F. Cootes, G. J. Edwards, and C. J. Taylor. Active appearance models. In *Proc. European Conf. on Computer Vision*, volume 2, pages 484–498. Springer, 1998.

[2] G.J. Edwards, C. J. Taylor, and T. F. Cootes. Interpreting face images using active appearance models. In *Proc. 3rd IEEE Int. Conf. on Automatic Face and Gesture Recognition*, pages 300–5. IEEE Comput. Soc, 1998.

[3] N. Schultz. *Segmentation and classification of biological objects.* PhD thesis, Department of Mathematical Modelling, Technical University of Denmark, Lyngby, 1995.

[4] M. B. Stegmann. Active appearance models: Theory, extensions and cases. Master's thesis, Informatics and Mathematical Modelling, Technical University of Denmark, Lyngby, 2000. http://www.imm.dtu.dk/∼aam/.

[5] M. B. Stegmann, R. Fisker, and B. K. Ersbøll. Extending and applying active appearance models for automated, high precision segmentation in different image modalities. In *Proc. 12th Scandinavian Conference on Image Analysis - SCIA 2001*, volume 1, pages 90–97, 2001.

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: $(1{<}{<}1) + (1{<}{<}2) + (1{<}{<}4) = 1 + 2 + 4 = 7$.

<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>
```