

Locating Landmarks in the Face

J. Kalina¹, P.L. Davies¹

¹ University of Duisburg-Essen, Fachbereich Mathematik, D-45117 Essen, Germany

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The topic is the automatic location of the mouth, eyes and nose in gray-scaled pictures of human faces. We use entirely the template matching method. One aim is to implement an algorithm so that it can be immediately applied in biomedical research, another is the comparison of various measures of the fit between a template and parts of the picture.

We work with gray-scaled pictures of size 192×256 pixels taken under standardized conditions. The person is sitting in front of the camera looking straight in it. The face may be slightly rotated and the size of the head can vary only slightly.

The mouth is located at first. Based on the result, we search for the eyes in a proper area. The nose is then easily located in a rectangle between the mouth and the eyes.

To measure the similarity between the template and a same-sized part of the picture, we use not only the correlation coefficient. Reasonable results are obtained for the weighted correlation, which is equivalent (up to the sign) with the (weighted) coefficient of determination in the weighted regression. We assign smaller weights to pixels with a larger distance from the midpoint of the template. Some of the nonparametric and robust measures include the Spearman's rank correlation; the correlation (classical or weighted) computed after removing h outliers detected by the least trimmed squares; the maximal correlation after removing any h -tuple of the data; or the weighted correlation with such weights which have been found optimal by the least weighted squares.

Creating the templates and their optimization is described and their performance is presented, as well as their robustness to a slightly different size of the head or rotation of the face.