

## IMAGE PROCESSING FOR PSYCHOANALYSIS

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Image processing for psychological analysis is a popular topic among different scientists. It has already been proved, that image processing for psychoanalysis is an effective way to know a lot about man's personality. This paper attempts to show which techniques could be used for psychoanalysis via image processing.

Image processing is used in almost every sphere of science. It's hard to imagine something, that doesn't need image processing. Its applications range from medicine to entertainment, passing by geological processing and remote sensing. Image processing aims to help people explore the world: there are tons of images, that's why it's really more effective to use computers rather than people for image processing. Usually image processing is used for determining different features on the images: somewhere it's necessary to find outlines on the images, somewhere it's necessary to find faces on the images, so, it depends on what we need in a specifically taken situation.

Speaking about psychoanalysis, there could be used many different techniques. Language of the body, manner of speaking, way of thinking — all these things can tell a lot about a man. Except all the things, listed above, there is one more, that can tell a lot about psychological portrait of a man — it's his face. Face tells really a lot about a man: his hidden desires, abilities, character and so on. Face may show even if a man wants to make a suicide.

This analysis could be done manually: a specialist needs to answer different questions so, each question is a kind of a feature on man's face. This means, that if it can be analyzed by a man, it can also be analyzed by a computer. It is necessary to find specific features and to determine the category they belong to.

In this paper I present the main steps for image processing in order to get psychological analysis of a man. I describe steps for preprocessing of the image and techniques for extracting the features from preprocessed images and tools which can be used for that. It must be mentioned, that techniques I'm going to present for psychological analysis don't give accurate result (80% of accuracy) due to many factors:

- quality of the image;
- conditions of the place, where the photo was taken (lighting, shadows).

As it was mentioned before, first of all the image should be preprocessed. Preprocessing includes the following:

- determining if the image contains face;
- extracting landmarks from the face in the image;
- aligning of the face in the image relative to the line perpendicular to the horizon, using landmark on the nose and chin;
- parting of the face in the image on left and right sides;
- creating two images of faces by mirroring each side of the face.

Determination of a face presence on the image can be done with a help of histogram of oriented gradients or HOG. A HOG is a feature descriptor generally used for object detection. HOGs are widely known for their use in pedestrian detection. A HOG relies on the property of objects within an image to possess the distribution of intensity gradients or edge directions. [1]

Face landmark detection is the process of finding points of interest in an image of a human face. The landmarks are calculated using Histogram of Oriented Gradients (HOG) feature combined with a linear classifier, an image pyramid and sliding window detection scheme.

Having a set of facial landmarks, face in the image may be easily parted on the left and the right sides. There are also no difficulties in creating two images of faces by mirroring each side of the face. [2] [3]

Extracting signs from the man's face can be solved with the use of neural networks. There are a lot of tools for creating neural networks, one of them is TensorFlow. To create a neural network with a help of this instrument we must have a lot of images with already detected features on them. The network analyses them and creates a model, which then can be used for extracting the same features from new images.

Image processing for psychoanalysis is not a new topic, but still, it's quite popular nowadays. It may be used to help people analyze other peoples' mental health, especially when there are big crowds of people, for example, in the armies, schools, universities and other public places.

References:

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