FH Vorarlberg
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Face recognition

Digital Signal Processing Project

University of Applied Sciences Vorarlberg
Master in Mechatronics

Submitted to

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1. Problem description

1.1 Overview

According to the articel *Face recognition: A literature survey* from ZHAO et al. (2003), face recognition can be segmented into three key steps, shown in figure 1.

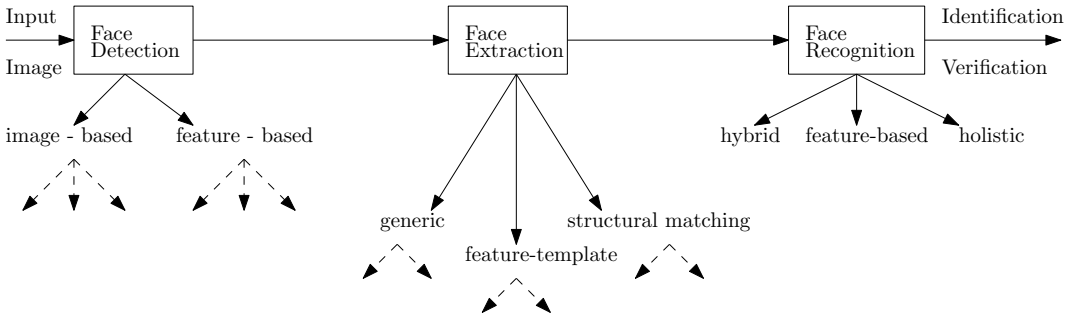

Figure 1: Face Recognition Progress

Face Detection is responsible for a rough normalization (like face tracking) and use for this task different approaches.
Face Extraction generates a more accurate normalization (like human emotions). The different approaches to get this emotions are shown in figure 1. Face detection and face extraction approaches can use the same feature-based-method (like informations out of color, Motion, ...)so they can perform simultaneous.
Face Recognition is the last step to identify/verify a picture. For a verification/identification several methods are available.

1.2 Face Detection

We decided to have a closer look on the face detection process because for the processes afterwards we need a detected face, which is not available without any effort.
To find an approach which we can study, implement and test we made further researches in this segment. The article *Face detection: A survey* from Hjelmas (2001) gives a good overview of the topic face detection. The figure 2 (out of Hjelmas (2001)) represents the different approaches to detect faces in a picture.

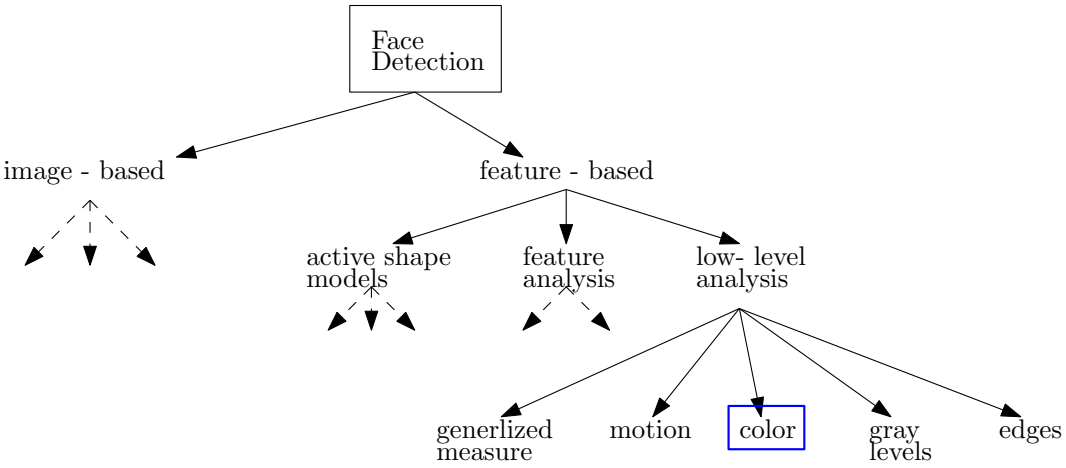

Figure 2: Face Detection divided into approaches (more detailed from Hjelmas (2001)).

According to Hjelmas (2001) are **Image-based approaches** the moste robust techniques for gray images, but on the other side they need a lot of computation time by multiresolution window scanning.
The **feature-based approaches** were the first attemps in the face detection history. They are built up simple and so they need less computation time, this enables these approaches access to real-time applications.

The most interesting approach for us was *Face detection based on color likelihood* approach (in figure 2 marked as *Color*).

2. Literature Analysis

The literature analysis began with the topic selection (see chapter 1). The supervisor told us that the initial chosen topic *Face Detection* is to big to treat within one semester, so the first literature research was done to find a specific topic to handle.
The second literature research was done to find information about the chosen topic.

2.1 Approach

All interesting literature which were found and marked as interesting (by scanning the abstract) were saved in a list on the Ilias project space. This articles were read in a more detail afterwards.
The structure of the table (see figure 3 make additional sorting (by exporting/copying into an EXCEL) possible and the implementation on ILIAS makes it possible to get access easily to the actual table.

Literature Research (LR)

ID	Date	Topic	Source	site	comment
1	22.10.2016	general	olav: face recogintion database	Science direct - On internal representations in face recognition systems	analysis of face recognition systems; mentoined databases: FERET and Face database info MIT
2	27.10.2016	general	google: face recoginition overview	Face Recognition: A Literature Survey	nice overview about face recognition (split into Detection, extraction and Recognition) -> Useful to search a more detailed topic.
3	27.10.2016	Face detecion	olav: face detecion	ScienceDirect - Computer Vision and Image Understanding - Face Detection: A Survey	Good overview about different approaches to detect faces
4	27.10.2016	Face detecion - color	olav: face detecion	ScienceDirect - Pattern Recogintion - Face detection based on skin color likelihood	Face detection based on color likelihood - approach of: Face detection -> Feature-based approaces -> low level analysis -> color

Figure 3: Literature reasarech table - 30.10.2016.

All literatures which were mentioned in this document are also listed in the bibliography.

2.2 Literature analysis of the topic face detection based on color likelihood

documentation why articles have been selected or rejected. All used sources must be mentioned here

Bibliography

Hjelmas, E. (2001). Face detection: A survey. *Computer Vision and Image Understanding*, 83(3):236–247.

ZHAO, W., CHELLAPPA, R., P.J.Phillips, and Rosenfeld, A. (2003). Face recognition: A literature survey. *ACM Computing Surveys*, 35(4):339–458.