Boosting 3-D facial features for Gender Classification

Context: The face is a biological billboard advertising physical overt features, environmental exposures and underlying genes. Numerous studies carried on identical twins, family resemblance and craniofacial disorders show a strong relationship between facial morphology and the genetic underlying component. The department of Medical Imaging Computing in Leuven has developed a novel technique to measure and model the facial variation in relation with sex, genomic ancestry and certain candidate craniofacial genes.

Gender classification is an important issue in intelligent systems that can be a useful preprocessing step for face recognition. Gender is similar to other soft biometric traits, such as skin color, age or eyes colors, used by humans to distinguish their peers. Most existing work on gender classification uses 2-D-images to extract distinctive facial features like hair density and inner morphology of the face, but 3-D shape has not yet been used extensively for gender classification.

![Example of some curves extracted on the facial surface from a boosting algorithm](image)

Aim: The challenge of the thesis is to work on different types of facial features and to learn the most relevant ones using adaptive boosting. The best-selected features will be used for the final goal of gender classification.

Work description: The milestones of the thesis are:

- A collection of selected features for 3D facial mesh representation
- A boosting method to highlight geometric features according to the target application
- Perform the gender classification task and compare the results with the latest methods on a common data set and common experimental settings

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Special circumstances / required skills: Basic programming skills, following machine learning courses

Location where work will be performed: This work will be performed at the Medical Imaging Research Center at the University Hospitals Gasthuisberg, a location where different technical and medical disciplines are grouped together to investigate medical image analysis related subjects.

Students: 1 or 2