Lightweight User Identification System

Research Internship, Bachelor’s Thesis, IDP

Description
More and more systems are able to authenticate and identify the user by their face [1]. At this chair, we develop models to match faces to given gallery of identities. First, the face of an unknown person is localized within an image by a face detection model. Next, the face is aligned such that eyes, mouth and nose are always on a similar position within the image [2]. The normalized face is passed onward to the face identification model, which can be interpreted as a feature extractor. This feature vector is then compared using a distance metric to feature vectors from the gallery.

The goal of this work is to, showcase this pipeline in a simple sales system. Using a Raspberry Pi + Camera + Touchscreen we want to allow users to log their coffee consumption. The user will be identified using the camera and then confirms their purchase with the touchscreen. The face identification model will be provided to the student. The task is then to use this model to implement the pipeline, build a GUI and evaluate the results in real-world use.

Depending on your personal interests you can choose from these additional tasks:
• Design a case in CAD for the system (that will be 3D printed)
• Fraud detection with photoplethysmography

![Face Detection Pipeline](image1.png)

![System Sketch](image2.png)


Area Computer Vision, Face Recognition

Requirements
• Good programming skills, ideally in Python
• Prior knowledge in Machine/Deep Learning is helpful
• Experience with OpenCV, Qt5 & Raspbian OS is a plus

Application
If you are interested in a topic in this area, we welcome the applications via the email address above. Please set the email subject to "<Type of application> application for topic 'XYZ'", ex. "Master’s thesis application for topic ‘XYZ’", while clearly specifying why you are interested in the topic in the text of the message. Also make sure to attach your most recent CV and grade report.

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