CS585 P1 Project Proposal

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The task we will focus on is *face recognition* (FR), because we are motivated by the academic and industrial significance of FR algorithms whose performances are on par with humans. Academics-wise, effective and transparent FR algorithms provide us with insights into how our own vision might work; industry-wise, effective and transparent FR algorithms are applicable to such a wide range of areas as mobile platforms (e.g. Apple Face ID), robotics (e.g. alongside emotion detection), and security services (e.g. identity verification). Contrary to Deep Learning, such transparent FR algorithms would allow for better diagnoses and/or debugging of these algorithms.

We are primarily inspired by the paper "Automatic face recognition system based on the SIFT features" by Ladislav Lenc and Pavel Král, 2015. We will implement our own Scale-Invariant Feature Transform (SIFT)-enabled FR algorithm that learns facial features from images and uses these features to effectively recognize faces. In addition, we want our algorithm to be able to recognize not only faces in training sets, but also faces in test sets.

To build a library of "ground-truth" faces, Yida will focus on face detection, face region extraction, face sub-region (e.g. eyes) extraction, and face transformation; Vitali will focus on SIFT key-points detection and SIFT descriptor calculation. After the SIFT-based processing, Vitali will also focus on "cleaning up" the face library: the objective is to, for each person's face, reduce the original set of all provided face images down to some fixed-size subset of the most "representative" of these face images. After that, we will both work on face recognition via matching, as well as computing the recognition results.

We will run our algorithm on the datasets mentioned in the paper, and compare our results with the authors' results.