



FINGERPRINT MATCHING USING SIFT FEATURES

A Proposal



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Introduction

Fingerprint Recognition is a method used to match fingerprint features against already stored samples for the purpose of identity verification. They are graphical features embedded in fingerprint ridges and valleys. Also included are minute patterns like bifurcation, ridge spots and ridge ends. These ridges and valleys can be recognized over fingertip surfaces.

Various methods of fingerprint matching exist such as minutiae-based systems, and while these methods have shown fairly high accuracies, further improvements are needed for an improved performance, especially in applications involving large scale databases. In an effort to improve the currently existing method, the ***Scale Invariant Feature Transformation (SIFT)***. This method involves extracting various feature points in a scale space and performing matching based on the texture information around characteristic points using the SIFT operator. Using a public domain fingerprint dataset, a SIFT based fingerprint matching system and compare its performance to conventional minutiae-based system.

Objectives

- i. Implement the Scale Invariant Feature Transformation (SIFT) algorithm using python programming language
- ii. Match two exact fingerprints using this algorithm
- iii. Measure its effectiveness against minutiae methods by distorting some parts of the image

Method And Design

Sample Data

The Kaggle [Sokoto Coventry Fingerprint \(SOCOFing\)](#) dataset will be used in the undertaking of this project. The database contains over 6,000 (Six Thousand) sampled fingerprint images, as well over 14,000 (Fourteen Thousand) alterations of these fingerprint images. A sample will be taken from this pool and compared with their altered version using the SIFT algorithm.

Procedure

A theoretical approach will be done detailing the important constituents of the SIFT algorithm including its advantages as well as it's time complexity. Following these characteristics, the algorithm will be implemented using the **Python Programming language** with a Graphical User Interface (*GUI*) built with **PyQt5**.

Analyses

The accuracy and speed of matching will be compared and from this a graph will be generated showing the false acceptance rate of each method.

Conclusion and Findings

This project will demonstrate that the SIFT algorithm is very efficient at matching fingerprints more efficiently than the currently existing minutiae-based methods of matching.