School of Engineering and Applied Science (SEAS),
Ahmedabad University

ECE501: Digital Image Processing

Group Name: Humans.exe

Project 2: Person Retrieval

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Team Members:

- Chaudhari Isha Rajeshkumar - AU2340147
- Chaklasiya Shrey Pareshbhai - AU2340106
- Mangukiya Ramkrishna Anantray - AU2340052
- Vachhani Hitarth Miralbhai - AU2340096

I. Introduction

- **Goal:** Person Retrieval – identifying and retrieving all images of the same person in a given image database.
- **Approach:** Implemented entirely using Classical Digital Image Processing (DIP) techniques, without any Machine Learning or Deep Learning models.
- **Current System:** Includes face detection, preprocessing, and feature extraction using Histogram, Local Binary Pattern (LBP), and Discrete Cosine Transform (DCT).
- **Similarity Measure:** Results are generated using Euclidean distance and cosine similarity for person matching.
- **Database:** 20 photos (4 persons $\times$ 5 photos each) with variations in lighting and facial expressions.

II. Objectives

The Person Retrieval project aims to build a system capable of retrieving all occurrences of a person from a given photo database using classical Digital Image Processing (DIP)

methods. The primary objective is to demonstrate that techniques such as Histogram comparison, Local Binary Pattern (LBP), and Discrete Cosine Transform (DCT) can be effectively used to extract and compare facial features for reliable person retrieval. This approach highlights the interpretability and simplicity of traditional image processing while maintaining good accuracy without complex learning-based models.

III. What has been done so far (Progress)

The team has successfully implemented face detection and preprocessing steps including grayscale conversion, resizing, and histogram equalization. Feature extraction using Histogram, LBP, and DCT has been performed for all database images. Similarity matching using Euclidean distance and cosine similarity has been tested to retrieve visually similar faces. Initial results show reasonable retrieval accuracy, establishing a strong foundation for further optimization and refinement.

IV. What is planned for next week

- Focus on improving the overall retrieval accuracy through parameter tuning and feature optimization.
- Experiment with adjustments or replacements of some feature extraction techniques if required.
- Analyze the influence of each feature type (Histogram, LBP, DCT) on matching performance.
- Prepare a refined version of the result dataset and evaluate consistency across multiple test cases.

References

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