

Ahmedabad
University

Project 2 - Person Retrieval

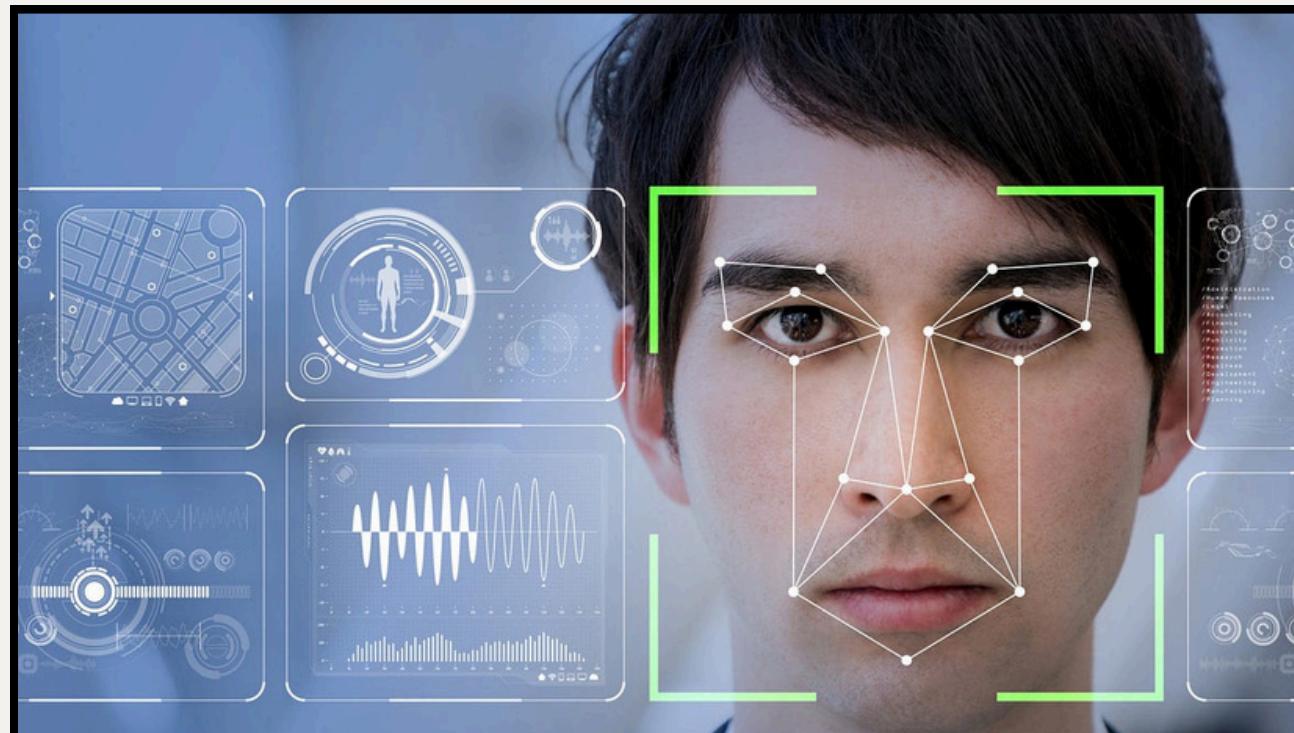
Mid-semester Project Presentation

Group - 15

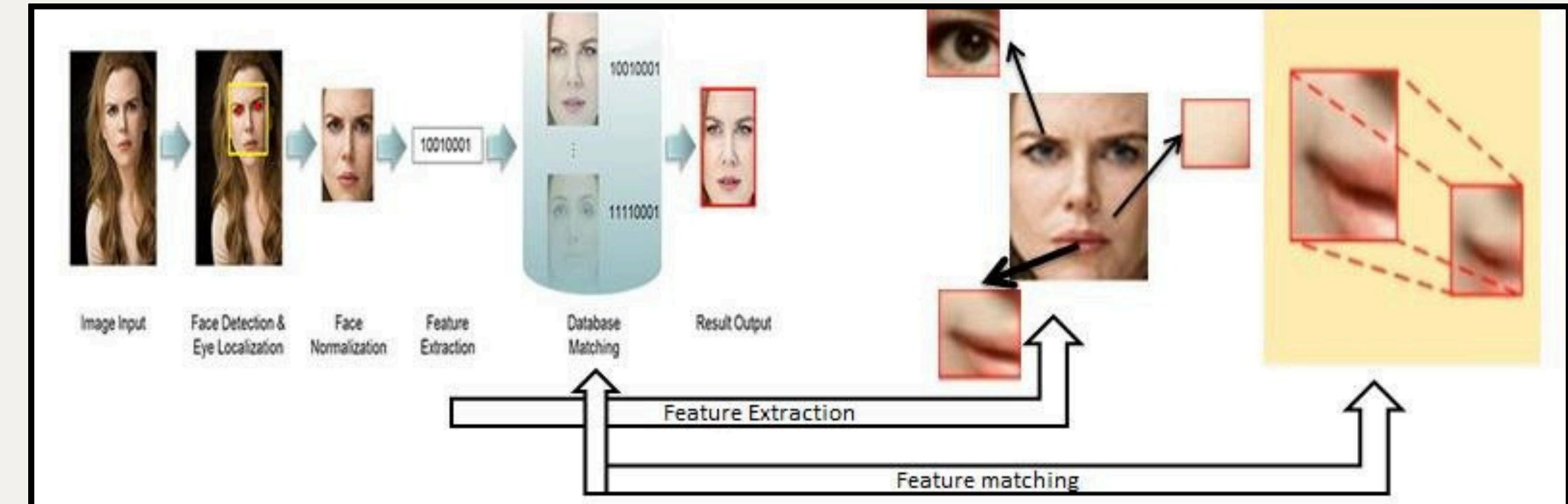
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Introduction

- Person Retrieval: finding all images of the same person in the given photo
- Normally done with **Machine Learning / Deep Learning**
- Our approach: **Only Classical Digital Image Processing (DIP) Techniques**
- Our Database: **20 photos → 4 persons x 5 photos each**



Using ML

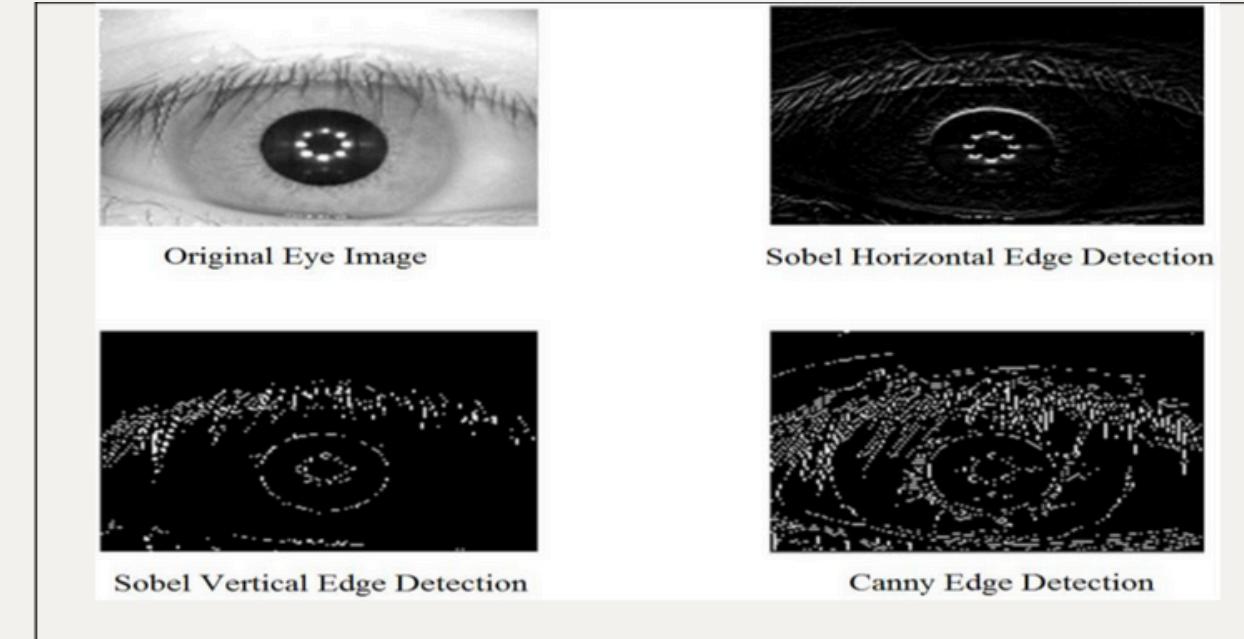


Using Classical DIP Techniques

Literature review

Traditional methods before deep learning used:

- Histogram-based similarity (color/gray-level comparison)
- Edge detection for facial structure
- Local Binary Pattern (LBP) for texture



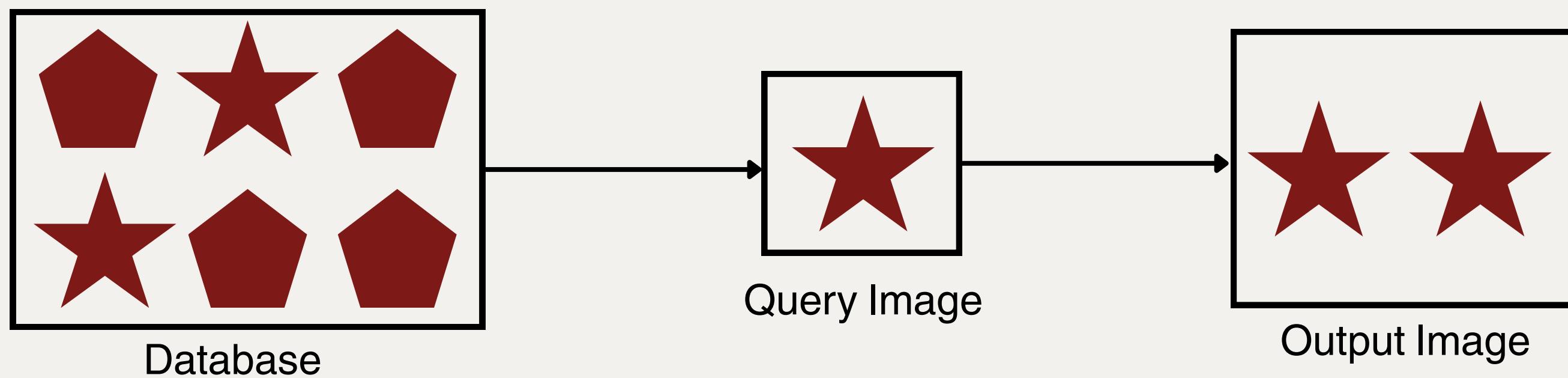
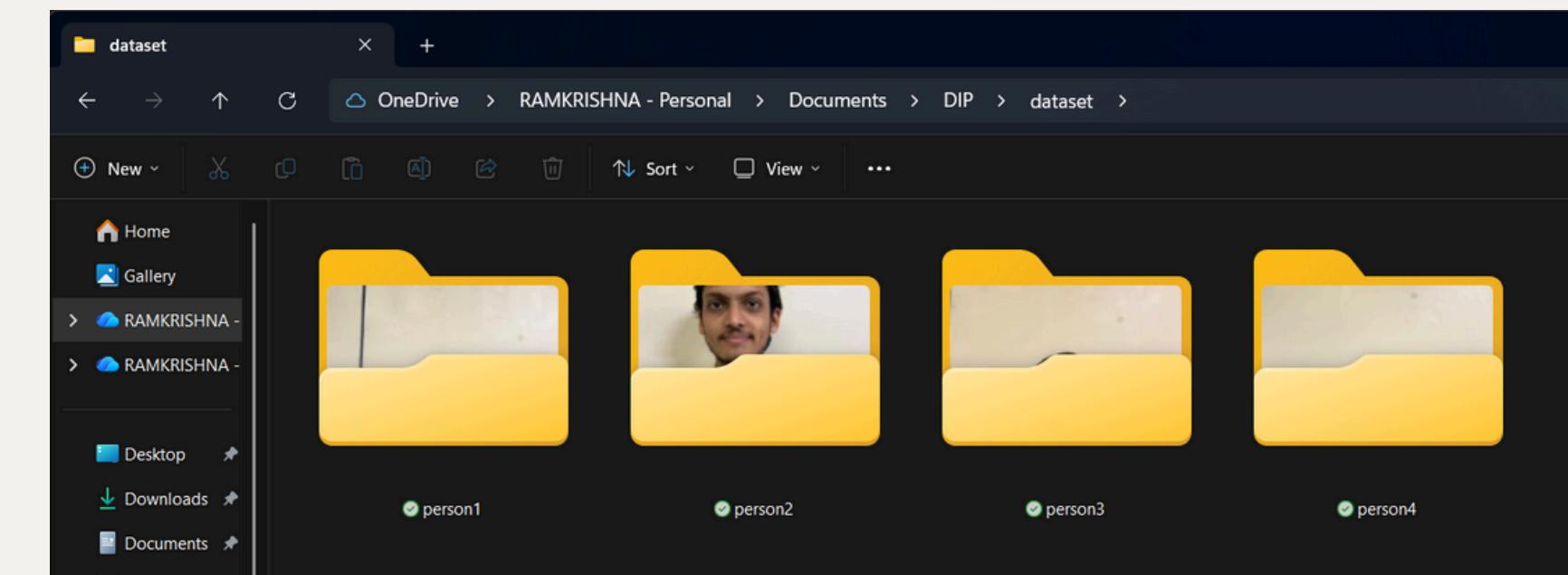
Reference works:

- Singh, G., & Goel, A. K. (2020). Face Detection and Recognition System using Digital Image Processing.
- Shtam, R., & Singh, Y. N. (2015). Automatic Face Recognition in Digital World (Vol. 2).
- Alhayani, B. S. A., & Rane, M. (2014). FACE RECOGNITION SYSTEM BY IMAGE PROCESSING (Vol. 5).



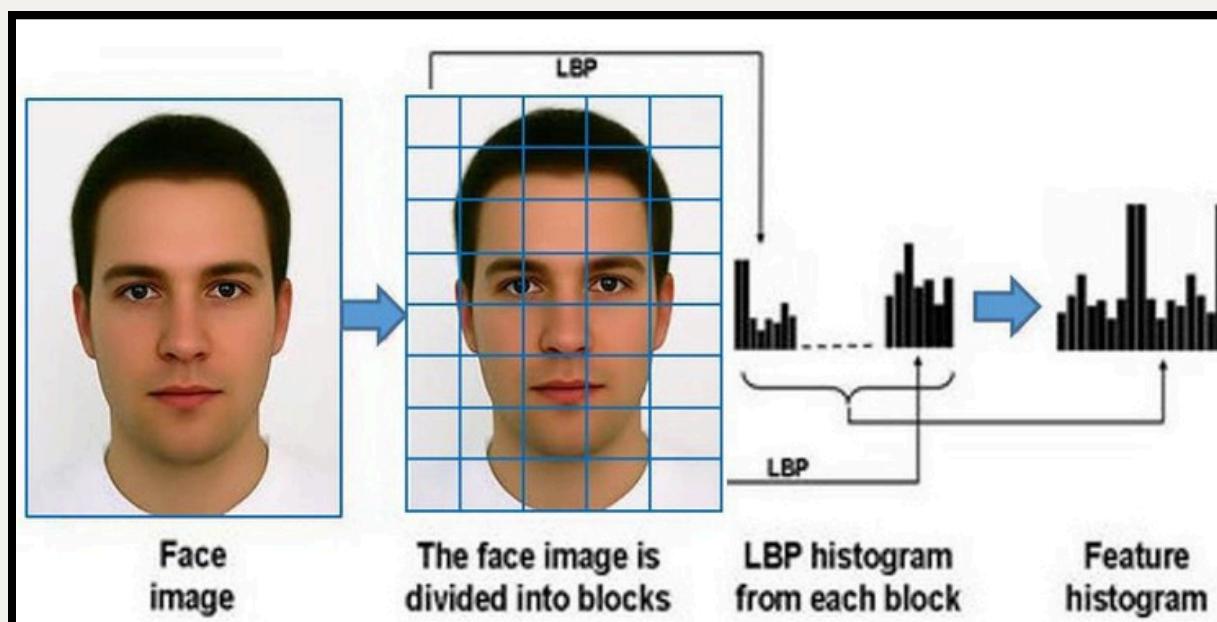
Dataset

- Total images: 20 (4 persons \times 5 images each)
- Each image captured under slightly different lighting and facial expressions.
- Database created manually for simplicity.
- Query image uploaded from user's computer and the results will be as shown below.

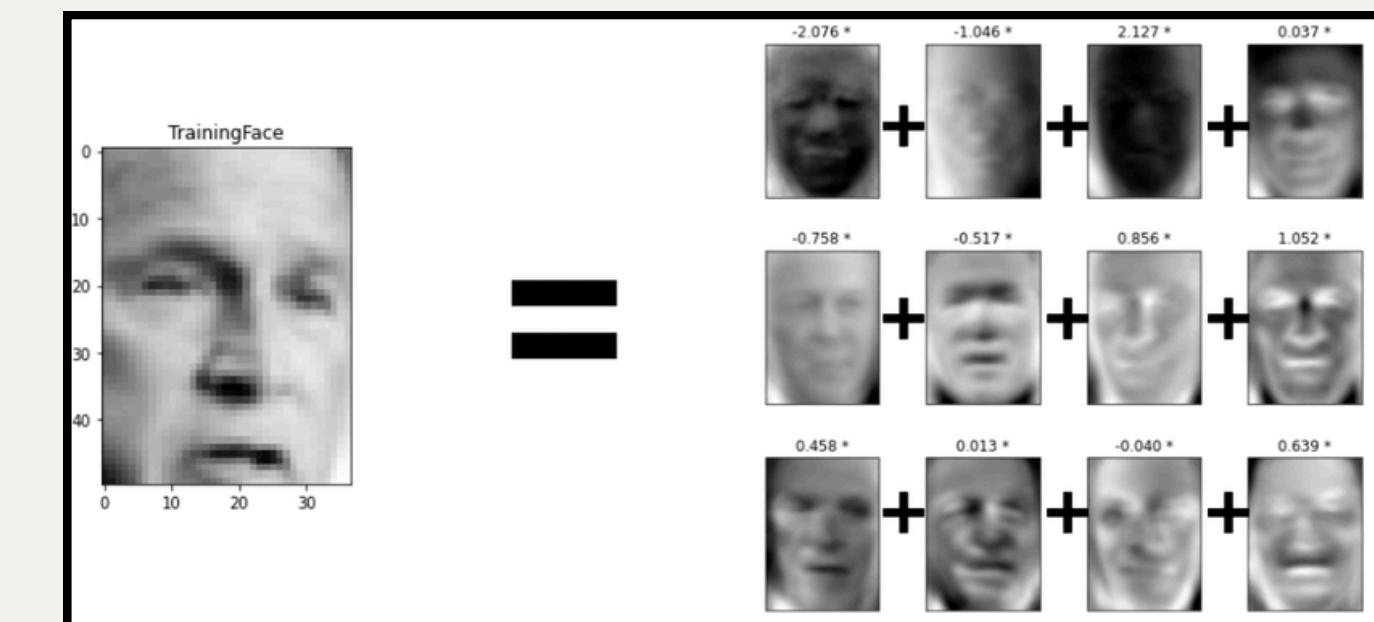


Methodology

- **Preprocessing:**
 - Grayscale, Resize, Histogram Equalization
- **Feature Extraction:**
 - Local Binary Pattern (LBP) - texture
 - Discrete Cosine Transform (DCT) - frequency
 - Principal Component Analysis (PCA) (Eigenfaces) - dimensionality reduction



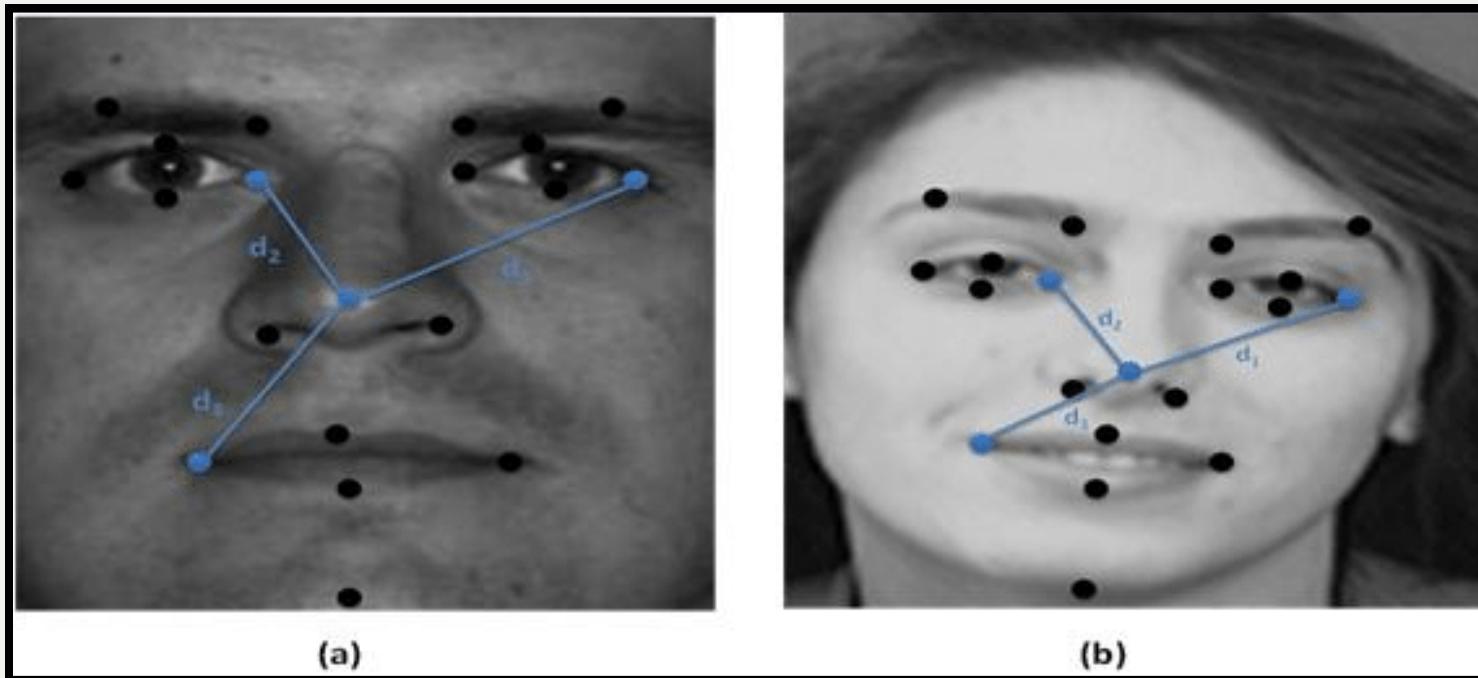
Local Binary Pattern



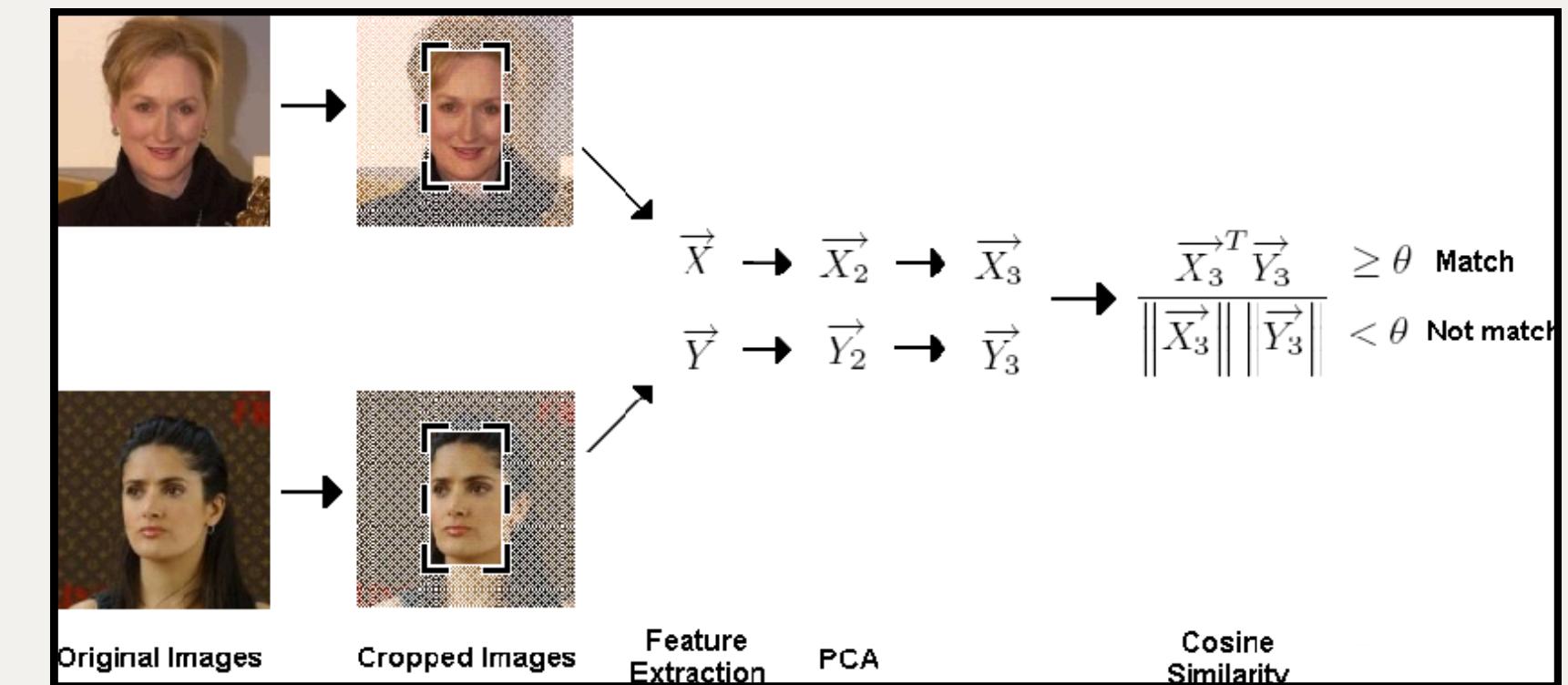
Principal Component Analysis

Methodology

- **Similarity Matching:**
 - Euclidean Distance
 - Cosine Similarity



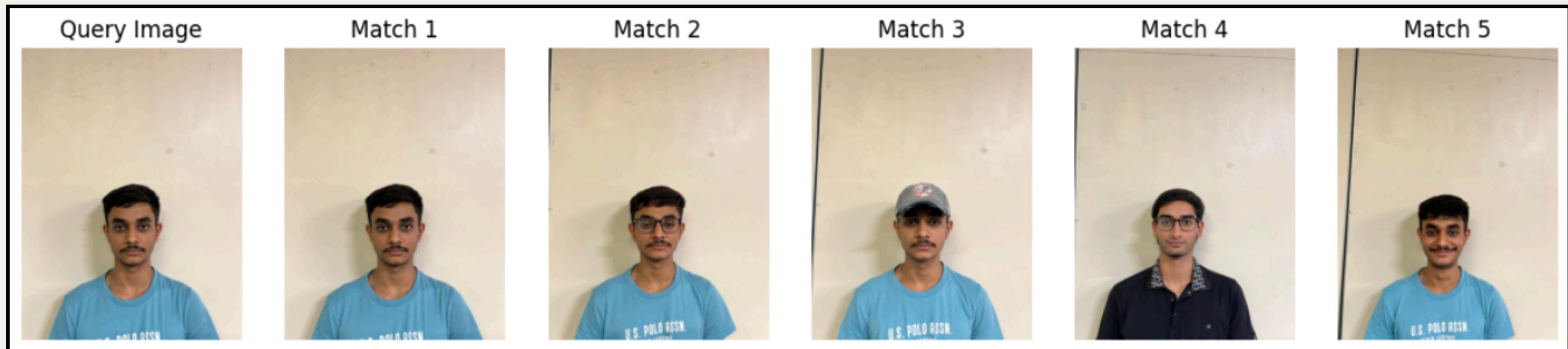
Euclidean Distance



Cosine Similarity

Results

- Query image and retrieved results displayed side-by-side
- Output shows **5 matching images**
- Retrieval accuracy is still not good for distinct faces
- Performance depends on lighting and pose variations

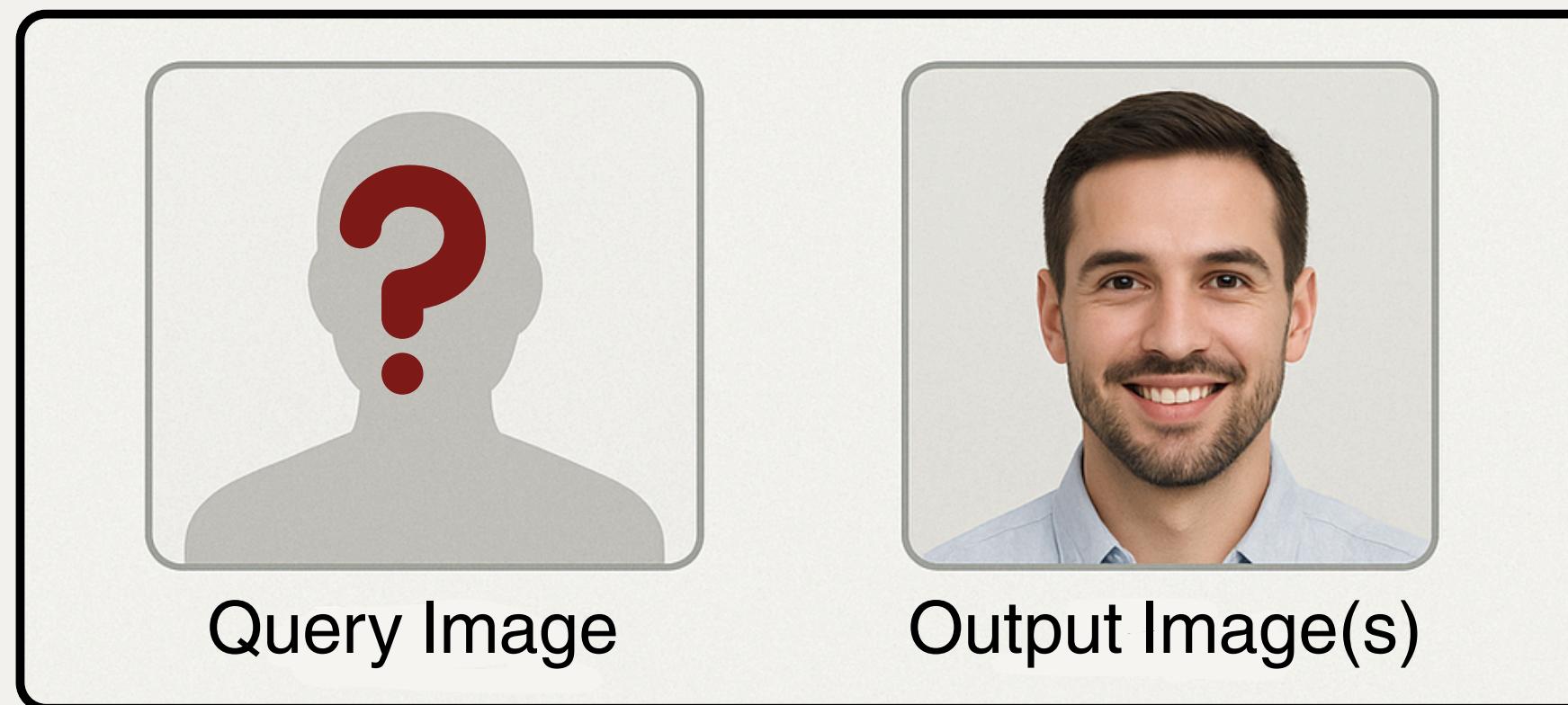


Conclusion

- The project successfully demonstrates Face Retrieval using only classical Digital Image Processing techniques.
- By combining color histograms, edge maps, and texture features (LBP), the system achieves reliable identification of visually similar faces.
- The implementation is efficient, explainable, and easy to reproduce without the need for large training datasets.
- Overall, this project highlights the power of fundamental image processing operations in solving practical computer vision problems.

Next Set of Work

- Improve robustness with:
 - Face detection before feature extraction
 - Weighted feature fusion
 - Cosine similarity or correlation metrics
- Extend database with more subjects and images for making the surety and increasing the precision of model.



References

- Yogalakshmi S., Megalan, L. L., & Simla, J. A. (2020). Review on Digital Image Processing Techniques for Face Recognition. International Conference on Communication and Signal Processing (ICCSP).
- Singh, G., & Goel, A. K. (2020). Face Detection and Recognition System using Digital Image Processing. International Conference on Innovative Mechanisms for Industry Applications (ICIMIA).
- Shtam, R., & Singh, Y. N. (2015). Automatic Face Recognition in Digital World (Vol. 2). Advances in Computer Science and Information Technology (ACSIT).
- Alhayani, B. S. A., & Rane, M. (2014). FACE RECOGNITION SYSTEM BY IMAGE PROCESSING (Vol. 5). International Journal of Electronics and Communication Engineering & Technology (IJECET).