

# PROJECT PROPOSAL

## PROBLEM STATEMENT

This project aims to develop a facial recognition system that can identify individuals from static images. It will analyze facial features and match them against a predefined dataset to recognize authorized faces.

## SIGNIFICANCE OF THE PROBLEM IN THE PAKISTANI CONTEXT:

Facial recognition can have a significant impact in Pakistan, particularly in:

- **Security and Law Enforcement:** Identifying suspects and missing persons.
- **Access Control Systems:** Securing sensitive areas and verifying identities.
- **Financial Services:** Enhancing security for online banking and transactions.

## SCOPE OF THE PROBLEM:

This project focuses on static image recognition. It will not handle real-time video streams or facial expressions. Additionally, the initial development will target a limited dataset of known individuals.

## DATASET INFORMATION:

We will utilize a publicly available dataset of facial images, such as well known Pakistani Faces Dataset ([reference publicly available Pakistani Faces Dataset]). This dataset offers a diverse range of Pakistani faces and is suitable for initial development.

## MACHINE LEARNING APPROACH AND EXPECTED ALGORITHMS:

Data Preprocessing: OpenCV library will be used for face and eye detection. Feature engineering will involve extracting relevant facial features using wavelet transforms.

Model Building:

Support Vector Machine (SVM) for robust classification.

Logistic Regression for efficient binary classification.

Random Forest for handling complex decision boundaries.

Model Tuning: GridSearchCV will be employed to optimize hyperparameters for each model.

## RELEVANT INDUSTRY AND PARTNER NAME:

Muhammad Usman Ali specializes in advanced research topics within the fields of Computer Vision (CV), Machine Learning (ML), Deep Learning (DL), and data domains related to image and text analysis, including federated learning.

## METHODOLOGY TO SOLVE THE PROBLEM:

Data Collection: Download and pre-process the Pakistani Faces Dataset.

Face Detection: Utilize OpenCV for face and eye detection.

Feature Engineering: Extract facial features using wavelet transforms.

Model Building: Train and evaluate SVM, Logistic Regression, and Random Forest models.

Model Tuning: Fine-tune each model using GridSearchCV for optimal performance.

Model Export: Save the best performing model to a file.

Flask Server: Build a Python Flask server to handle HTTP requests from the UI.

UI Development: Design a user interface using HTML, CSS, JavaScript, and jQuery for user interaction and image upload.

## GROUP MEMBER NAMES:

Hafsa Shahab, Hania Hasan, Sarmad Ahmed, Mustafa Khan