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Attendance Management System using Face Recognition

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Definitions, Acronyms and Abbreviations

LBPH - Local Binary Histogram Pattern

References

This section describes the complete list of documents referred to prepare the High Level Design. This section shall describe the title, version number, dates, authors and publishers of the referenced documents whenever applicable.

If industry standard methodology is used for design, it will be clearly mentioned here. If however, other methodologies are used, the deviation from a standard methodology will be clearly described.

Change History

This section describes the details of changes that have resulted in the current High-Level Design document.

#	Date	Document Version No.	Change Description	Reason for Change

1. Introduction

1.1. Overview

This application design document describes the architecture and system design of Attendance management system using face recognition, a facial recognition based system for the attendance management. It is intended to outline the system structure and provide technical guidance to the development team.

1.2. Scope

Face recognition is an important application of Image processing owing to its use in many fields. Identification of individuals in an organisation for the purpose of attendance is one such application of face recognition. Maintenance and monitoring of attendance records plays a vital role in the analysis of performance of any organisation. The purpose of developing attendance management system is to computerise the traditional way of taking attendance. Automated Attendance Management System performs the daily activities of attendance marking and analysis with reduced human intervention. The prevalent techniques and methodologies for detecting and recognising face fail to overcome issues such as scaling, pose, illumination, variations, rotation, and occlusions. The proposed system aims to overcome the pitfalls of the existing systems and provides features such as detection of faces, extraction of the features, detection of extracted features, and analysis of students' attendance. The system integrates techniques such as image contrasts, integral images, colour features and cascading classifier for feature detection. The system provides an increased accuracy due to use of a large number of features of the face. Faces are recognised using Euclidean distance and k-nearest neighbour algorithms. Better accuracy is attained in results as the system takes into account the changes that occur in the face over the period of time and employs suitable learning algorithms.

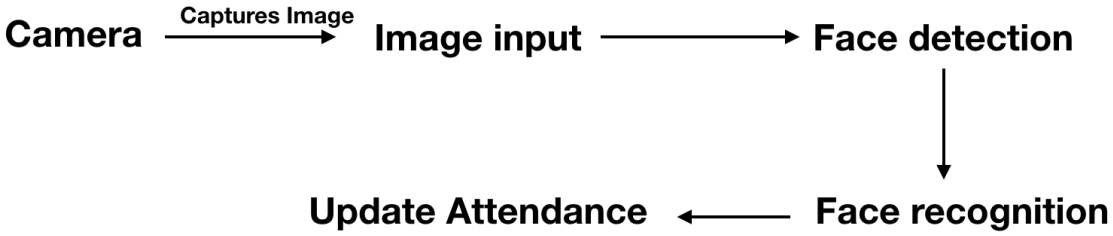
2. Design Constraints, Assumptions and Dependencies

This section of the document shall provide a general description of any other item that will limit the developer’s option for designing the system. These can include the following:

- Zero power shut-down tolerance
- System capable of handling 5 requests
- Preferable to Linux os
- Clean visuals for the Camera
- Operations and updates should be atomic
- User access only after credential check
- Privileged access to lecturers to schedule special class/cancel class
- Student restricted only to view and submit request upon wrong marking

3. Design Description

This his section explains briefly about the major modules and classes.



3.1. Master Class Diagram

A class diagram of the entire system will be given at a high level and then broken down into sub levels in each of the classes below.

3.2. Face Detection module

3.2.1. Description

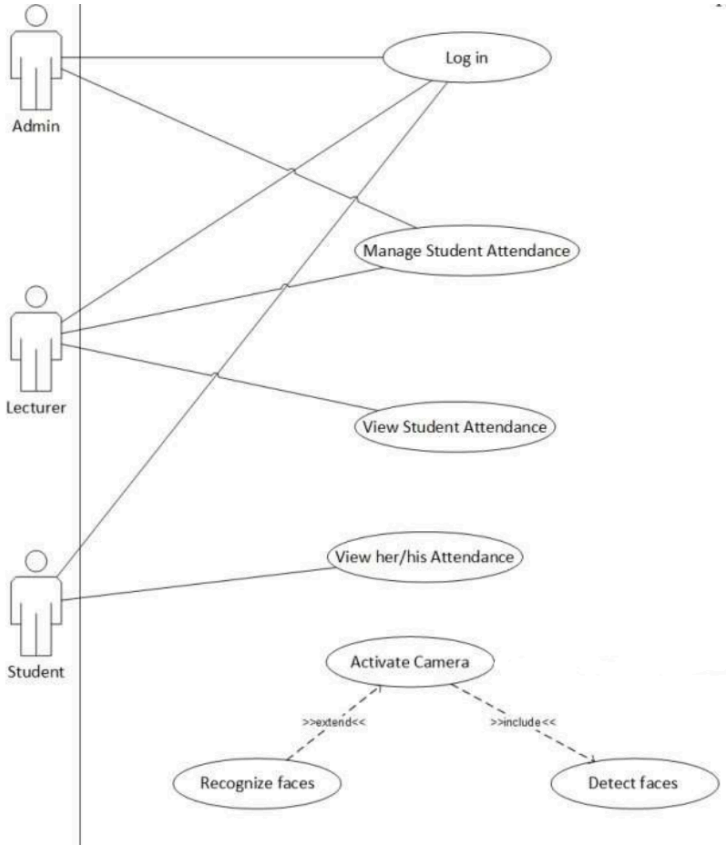
We have developed a face detection module using Java by leveraging LBPH .

Local Binary Pattern (LBP) is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighbourhood of each pixel and considers the result as a binary number.

It was first described in 1994 (LBP) and has since been found to be a powerful feature for texture classification. It has further been determined that when LBP is combined with histograms of oriented gradients (HOG) descriptor, it improves the detection performance considerably on some datasets.

Using the LBP combined with histograms we can represent the face images with a simple data vector.

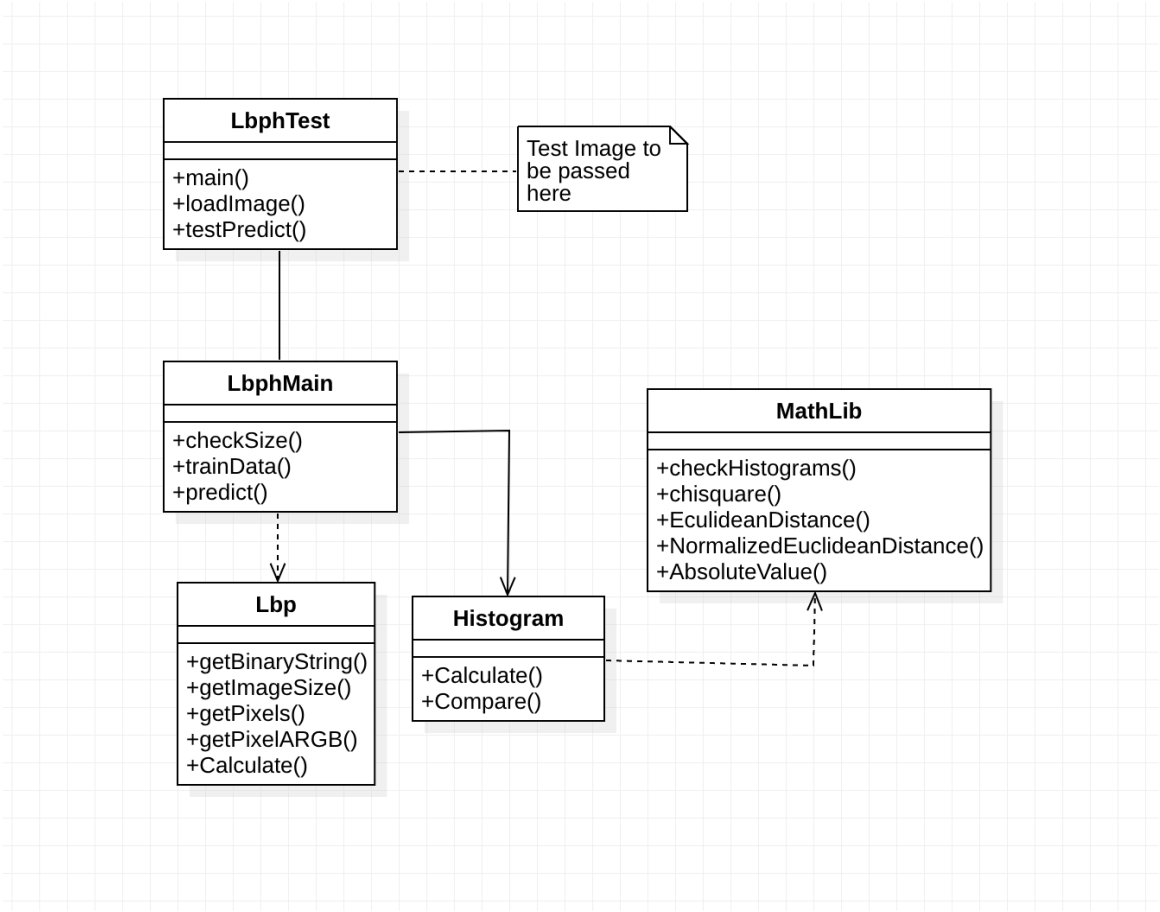
3.2.2. Use Case Diagram



Use Case Item	Description
Admin	Manages the portal
Lecturer	Manage and view attendance
Student	View attendance status

3.2.3. Class Diagram

Here, a description of each class in this class diagram will be given. A diagram of the entire system will be given at a high level and then broken down into sub levels. Classes maybe repeated across class diagrams, to show the interfaces with other classes. The detailed explanation of each class with its methods will be covered in the low-level design document.



1. <LBPH>

1.1. LbphTest

1.1.1. Class Description 1

Base class to test and train images

1.1.1.1. LoadImage

The following details shall be defined for the methods:

- Load image from the FilePath
- File name
- BufferedImage

- String Filename
- IOExceptions

1.1.1.2. TestPredict

- Input Training Images
- TrainData
- Stdout TrainedSuccessfully if no Exceptions

1.2. LBHP

1.2.1. Class Description 2

1.2.1.1. CheckSize

- Get the size of the image
- Check for null images in the List

1.2.1.2. TrainData

- Get Pixels from the the image to a 2d array from rob values
- Form the Histogram
- Add histogram to the list of histograms

1.2.1.3. Predict

- Get Trained image Histogrrams and compare them
- Output Image which is very near to the trained Image

1.3. MathLib

1.3.1. Class Description 3

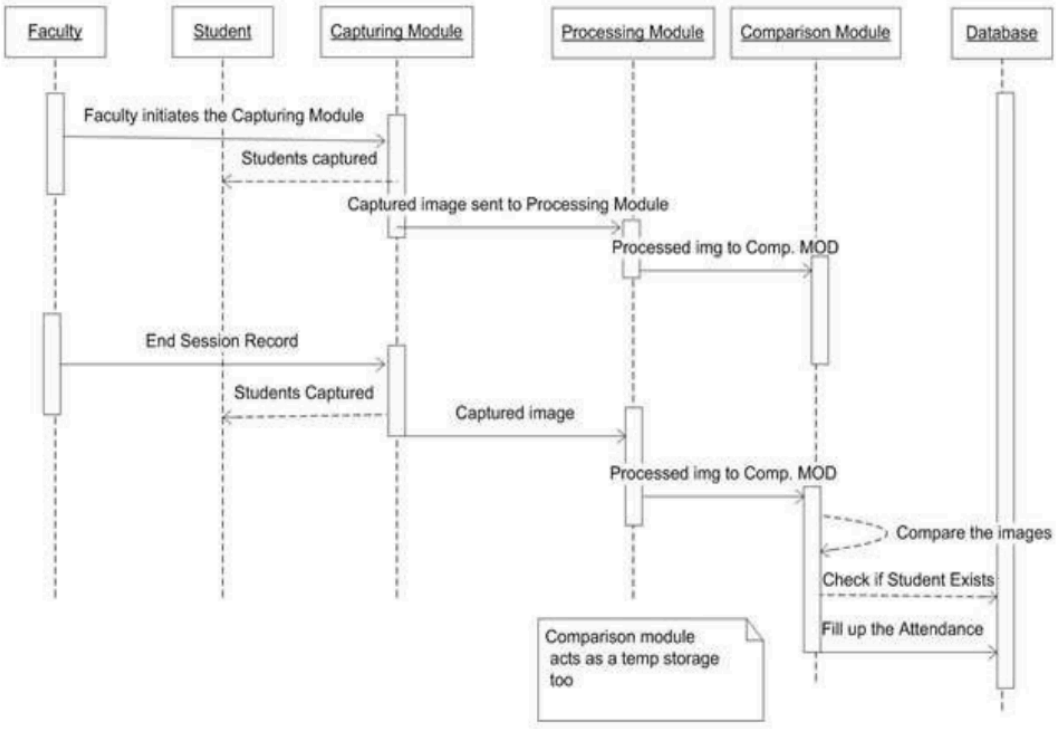
1.3.1.1. CheckHistograms

- CheckHistogram for not null size
- Return 1 or 0

1.3.1.2. Chi-square , Euclidean , Normalised , Absolute

- **To check difference of the histogram**

3.2.3.1. Sequence Diagram



5. User Interface Diagrams

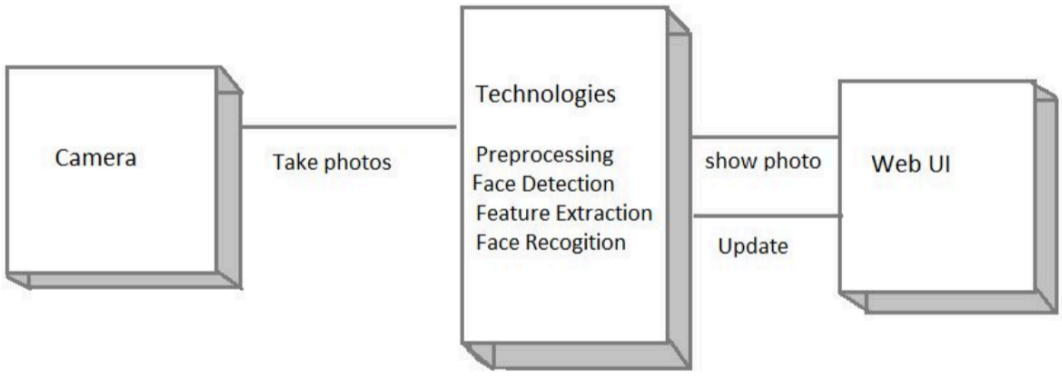
A brief description of the screen will be given here. Screens will have references to the appropriate CRS section.

6. Report Layouts

No report layouts information yet.

7. Packaging and Deployment Diagrams

The packaging and deployment diagrams for the system is presented below:



8. Help

This section shall describe the help planned for the system like, online / context sensitive help and other documentation (e.g. User Manual, Technical Manual) planned, to aid in the usage of the system

9. Alternate Design Approach

Alternate design approaches need not be re invented since the existing methodologies are already in use.

10. Reusability Considerations

The reusability considerations planned for the project. They comprise of the following:

- Software can be used for faculty attendance purposes also in the future.
- Can be implemented in firms also.