Attendance Monitoring System

Using Image Recognition

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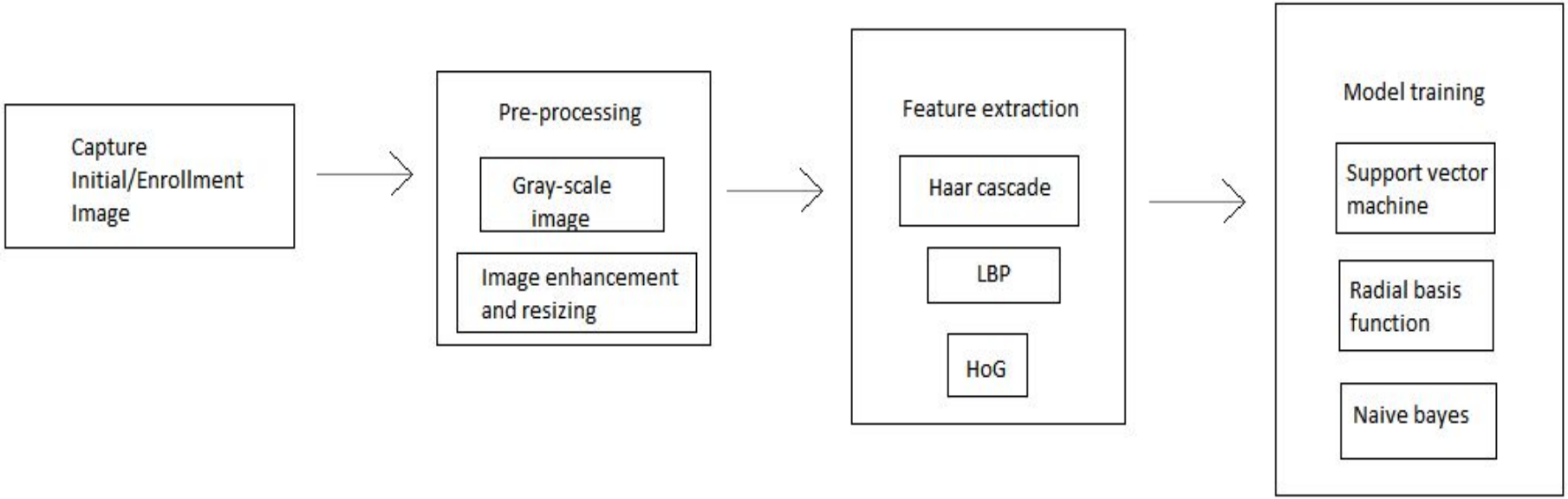
Introduction: Image Acquisition

Our proposed solution attempts to mark attendance of students during lecture hours by using multiple cameras at multiple places, which would take photos of the assigned portion of the class at multiple time intervals. These photos are stored at a server, where the face detection and recognition process commences.

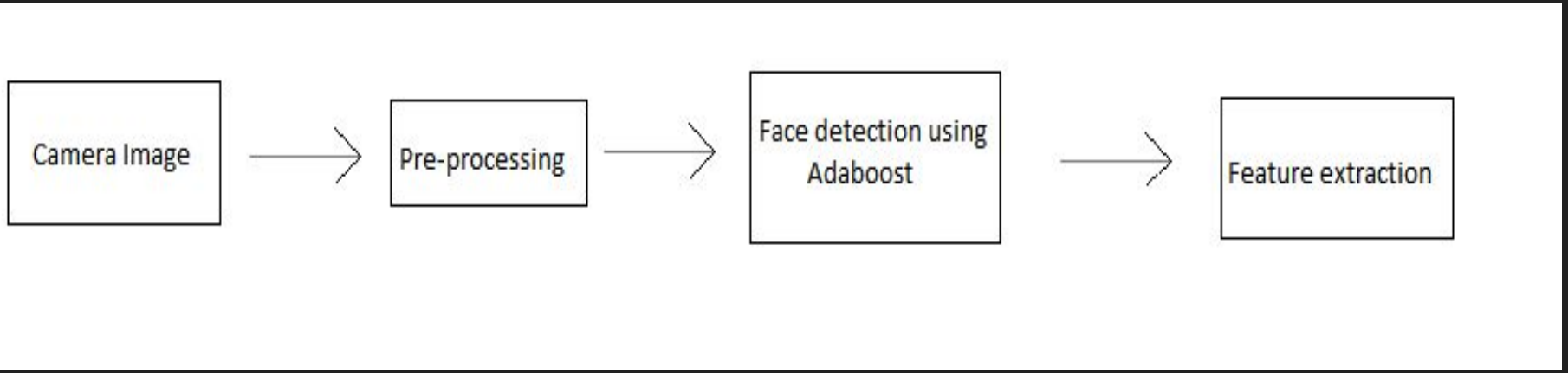
Implementation Modules:

1. Creation of database
2. Image acquisition
3. Pre processing
4. Face detection
5. Face recognition
6. Attendance(Excel sheet manipulations)

Initial training process



Face detection



Face recognition

Pre-processing:

1. Gray-Scale Image Conversion: Converting the colored RGB image to a gray-scale image as luminosity is an important parameter in distinguishing visual features, and gray-scaling would aid in this process.
2. Image enhancement and resizing: employed for removing noise from the image, and resizing it to the adequate dimensions.

Feature Extraction

One of the following algorithms can be used for feature extraction:

1. HAAR feature-based cascade classifier: It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images.
2. Local Binary Patterns(LBP): is a type of visual detector used for classification in Computer Vision.
3. Histogram of oriented gradients(HoG):The image is divided into small connected regions called cells, and for the pixels within each cell, a histogram of gradient directions is compiled. The descriptor is the concatenation of these histograms, which is further used for image classification.

Model Training:

A machine learning model would be trained on the basis of the initially extracted features, and further, it would help us in classification during the real-time attendance system. The machine learning algorithm which can be used are:

1. Support Vector Machine
2. Radial Basis Function
3. Naive Bayes

Post-training

Multiple cameras are appointed to cover specific portions of the class, which would take pictures at regular intervals of time. The images on the server, is then passed through a face detection algorithm(Adaboost algorithm), after which feature extraction algorithm is run (for each face in the frame). The extracted feature vectors are then used to test the trained classifier model, which would mark the attendance for the faces detected in an excel sheet.

References:

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3. Rapid Object Detection using a Boosted Cascade of Simple Features by Paul Viola and Michael Jones at 2001 IEEE.
4. Real Time Face Recognition Using Adaboost Improved Fast PCA Algorithm. International Journal of Artificial Intelligence & Applications (IJAIA), Vol.2, No.3, July 2011