Synopsis On

**One to many face recognition for attendance turning mobile**

INDUSTRY SPONSORSHIP: REIL / MSME - JAIPUR



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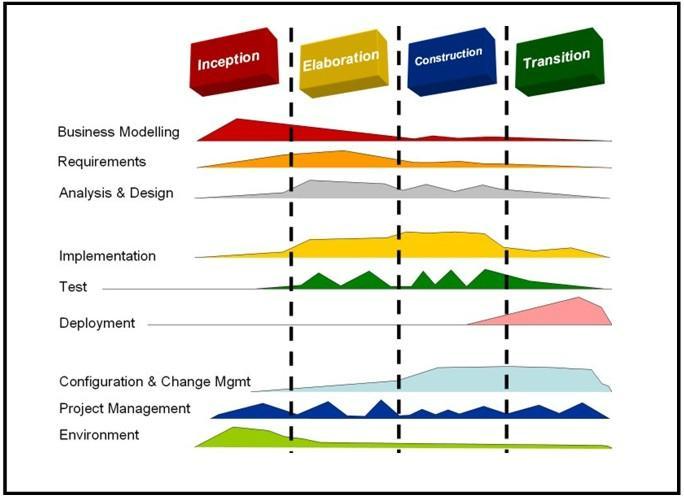
**Introduction**

* 1. **Methodology**

**Rational Unified Process:**

The Rational Unified Process brings together elements from all of the generic process models, sup-ports iteration and illustrates good practice in specification and design. The RUP is normally de-scribed from three perspectives:

* A ***dynamic perspective*** that shows the phases of the model over time.
* A ***static perspective*** that shows the process activities that are enacted.
* A ***practice perspective*** that suggests good practices to be used during the process.



**Fig. 1: Phases of RUP**

The different phases in RUP are:

* **Inception**

The goal of the inception phase is to establish a business case for the system. Identifying all external entities that will interact with the system and defining these interactions. This information is used to assess the contribution of system to business.

* **Elaboration**

The goals of the elaboration phase are to develop an understanding of the problem domain, establish an architectural framework, develop project plan and identify key project risks.

* **Construction**

This phase is concerned with system design, programming and testing. Parts of the system are developed in parallel and integrated during this phase.

* **Transition**

This is the final phase of RUP and is concerned with moving the system from the development com-munity to the user community and making it work in real environment.

* 1. **Purpose**

Face Recognition is a computer application that is capable of detecting, tracking, identifying, or verifying human faces from an image or video captured using a digital camera. Although lot of progress has been made in domain of face detection and recognition for security, identification, and attendance purpose. The human face is a sophisticated multidimensional structure that can convey a lot of information about the individual, including expression, feeling, facial features. Effectively and efficiently analyzing the features related to facial information is a challenging task that requires lot of time and efforts. Recently, many facial recognition-based algorithms for automatic attendance management have been proposed, successfully implemented and used as in Refs. [1–4] and also new algorithms developed, or some existing algorithms improved or combined with other methods, techniques, or algorithms to build facial recognition systems or applications as in Refs. [5–8].

* 1. **Scope**

The scope of this system is as follow:

* In Education level organizations.
* In private companies.
* Public sector
* Hospital like patient, nurse, doctor, and other staff.
* All type of Shops.
  1. **Tools Used**
     1. **Python**
     2. **Matlab**

**2. Literature review:**

Kohonen Ref. [9] is one of the early pioneers of the most famous face recognition system, which employed a simple neural net using network of Eigenfaces by approximating eigenvectors through face images auto- correlation matrix. Although, the method was not very successful to be practically implemented in a real-life environment due to associated high demand for normalization and positioning when run in a large database with many types of face conditions.

In harnessing and improving the work of Kohonen, Kirby and Sirovich in 1990 as in Ref. [10], directly calculated the Eigenfaces using algebraic manipulation with fewer than 100 faces to implement facial recognition, which was further improved by Turk and Pentland in 1991 as in Ref. [11] by determining the exact location and scales of faces and also the use of coding residual error originated from Eigenfaces, but in a minimally constrained environment.

Better and more novel approaches than Kohonen approach for facial recognition using; Principal Component Analysis (PCA), Fisherfaces and the traditional Local Binary Patterns (LBP) were proposed, particularly the LBP, because it has a simple theory with computational simplicity, invariant with respect to any monotonic transformation of gray scale, has powerful rotation-invariant analysis with a uniform pattern and dis- criminates excellently between different various kinds of texture as in Ref. [12], but It is known that the LBP is not as robust as the viola-jones and other algorithms for face detection as highlighted in Refs. [13–15], because of issues such as noise, illumination variation, background, pose, scale and occlusion etc.

In addressing the issue of illumination variation, Ref. [16] mitigated illumination variation in facial recognition by combining the strengths of robust illumination normalization, local texture-based face representa- tions, distance transform based matching and kernel-based feature extraction and multiple feature fusion, but the solution addressed only illumination issues. To address issues of noise in facial recognition, Ref. [17] employed shearlets and LBP for dealing with heavy noise in face recognition, by taking advantage of robust features and edge detection capabilities of shearlets in the presence of high level of noise. In this method, each face is divided into blocks, individual classifier is used for each block and then combine the similarity scores from all the blocks for better performance, but the solution is limited to noise only.

Recently, different methods, techniques and algorithms were com- bined with either the traditional LBP or modified LBP to achieve facial recognition and enhance facial recognition accuracy. In Ref. [18] a Real-Time Multiple Face Recognition using Deep Learning on Embedded GPU System was proposed and the method used face detection based on

convolutional neural network (CNN) with face tracking and state of the art deep CNN face recognition algorithm.

In addition, in Ref. [19] a Local Binary Pattern Histogram (LBPH)-based Enhanced Real-Time Face Recognition was used to achieve real-time face recognition in low and high-level images and Ref. [20] proposes a method of Improving the Recognition of Faces using LBP and SVM Optimized by PSO Technique, in this method, two feature extrac- tion algorithms namely Principal Component Analysis (PCA) and Local Binary Pattern (LBP) techniques are used to extract features from images. In the recognition process, it uses Support Vector Machine (SVM) for classification combined with Particle Swarm Optimization.

In another approach in Ref. [21], facial recognition was achieved using Modified Local Binary Pattern and Random Forest, which the sign and magnitude features are combined for the improvement of facial texture classification performance and when compared with the tradi- tional LBP for multiple patch variations on a challenging facial dataset, this method proven to be more accurate.

**3. Flow diagram of the system:**

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Fig. 2: Flow diagram for the system[22]

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