**4. OBJECTIVES**

1. To study different authentication mechanisms for vision and behavioral pattern recognition in closed environment.
2. To compare existing techniques for pattern recognition.
3. To capture an image of individual from different angles at different time slots.
4. To analyze the image on different parameters to get desired outcome.
5. To analyze different behavioral pattern, sentimental pattern of an individual to predict behavior of an individual at the time of examination.
6. To propose deep learning-based tool which captures image and with the help of different deep learning methods of pattern recognition will analyze image for achieving maximum level of authenticity on basis of various parameters.
7. **METHODOLOGY**

To evaluate the problem defined by the user the three-layered model is proposed.

**Image Capture**

**Image Train**

**Image Recognition**

**Figure 2: Three-layered model**

This model is further divided as per its work and the work flow is defined in the form of flowchart which is shown in following diagram.

The below flowchart depicts the actual workflow of system in which user needs to be registered user by doing registration and filling up all the details along with photograph. Once he/she is registered, he/she can login. While login process his face will be scanned and matched with stored dataset.

If it matches then only, he can continue with examination and this is done with help of pattern matching and can be considered as first level of authentication. Similarly, at the exam time, timers are set and the random snaps from different angles, different pose and along with body movements can be tracked. Each time the snaps are matched by applying pattern matching algorithms to all stored data sets. If it matches then only that user is allowed to continue his examination. In this way multilevel authentication is properly followed and if all result sets matches then only his final submission of examination can be done.

**The evaluation pattern is divided into following models:**

1. **Capture**: The browser-based system is designed to capture the images and used JavaScript and some concepts of deep learning.
2. **Train:** Once the images are captured the Blob of image data is generated. While training the

captured image, extractions of various features can be done. Feature extraction can be done

with help of HAAR cascade model and we try to do pattern matching for various parts of face such as whole face, eyebrows, nose, mouth, lip etc.

1. **Recognition:** This can be considered as last step as we have captured the images and stored in a Blob format which further can go through the operations of extraction and pattern matching. In this stage the process of recognition of image can be done and this can match in percentage i.e. 100% or 90% or 80% etc.

Continue the exam

Take a snap randomly in a frequent interval

Take a snap from different pose/angle

A

Login

C

If Authenticated

Yes

Capture the image

No

C

Pattern matching of image with stored image

If all pattern matches

C

No

Yes

Yes

No

Start

Registration of User

B

If registration Successful

B

Flowchart

classify the image as per parameters

If Classification appropriate

Yes

Continue exam

No

D

After completion stop the process

Stop

A

Process of Pattern matching/skeletal matching of image

If

Pattern matches & Authenticate User

Continue exam

Yes

No

If

Invalid Match Count <=3

C

Yes

No

Exit & Stop Exam

D

A - Continuation of process

B - Registration of User

C- Login

D - Exit & Stop Exam

**Figure 3: Architecture of Proposed Model**

**SOFTWARE AND HARDWARE REQUIREMENTS**

**Software Requirements:**

**Operating System** Ubuntu/ Windows

**Backend Language** Python

**Frontend** Jquery, CSS, HTML

**Database** Postgresql v10.3

**Libraries**

dlib

OpenCV v3.3.2

scikit

imutils

numpy

tensorflow 1.13

**Hardware Requirements:**

**Processor :** Intel Core i7 processor

**RAM :** Minimum 8 GB

**Hard disk :** Minimum 500 GB

**Webcamera**

**6. LIMITATIONS**

1. Only Examination system is considered for study.
2. Closed environment is used.
3. There are so many platforms, frameworks and algorithms available related to face recognition but here Caffe Framework is used.
4. There are so many tools and techniques available for studying the behavioral pattern but user has chosen deep learning-based algorithms.