

Facial Gesture Detection and Eye Tracking for checking personality traits during technical tests.

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Abstract – Automated analysis of human facial gesture and voice emotions is becoming an area of intense interest in Computer Science and Human-Computer interaction communities. Similarly, during the technical interviews it will be possible to find whether the candidate is honestly replying to all the questions by measuring the change in emotions during his responses and co-relating it with the vast amount of knowledge available. Detecting a face is most important to till the gesture or signature such as smile, sad, laugh, surprised, etc. type of emotions performed. Face detection has been the most important and active research field. A candidate/interviewer interaction is susceptible to many categories of emotions. Such emotions make it hard to determine whether candidate's personality is a good fit for the job. We cannot determine what the candidate is trying to say. The goal of this is to measure candidate's facial expressions to capture their moods and further access their personality traits.

Key Words: Face gesture detection, Eye-ball movement tracking, Natural Language Processing.

1.INTRODUCTION

Computer Facial gesture detection would be highly beneficial for virtual interviews done using famous software's like Skype, Google Hangouts, Facebook video chat, etc. A Facial expression positions of the muscles beneath the skin of the face. Facial expressions are a form of nonverbal communications. When we are face-to-face with another human, no matter what our language, cultural background, or age, we all use our faces, hands and body as an integral part of our communication with others; faces change expressions continuously and spontaneous gestures occur accompanying our speech. Understanding facial expression and their meaning is important part of communication. Facial expression analysis is done in two ways: from static images or from video frames. Psychological research has classified six facial expressions which correspond to distinct universal emotions: disgust, sadness, happiness, fear, anger, surprise. Four of out of six are negative emotions. In recent years there has been a tremendous interest in automated facial gesture analysis.

Facial gesture tracking helps the interviewer to detect whether the candidate is answering the questions confidently or not. There are 21 types of facial gestures and the easiest way to track a person's mood or emotions is through their face gestures. While interviewing a candidate, if the candidate is looking around it's obvious that the candidate is distracted or not fully confident about their answer.

Some important factor while interviewing a candidate is to check their confidence while answering these questions, eye contact, body gesture, etc. Considering those aspects, a

candidate is selected. A person's eyes reveal a lot about what they are thinking and what is going through their mind, based on that interviewer will know if the candidate is nervous or confident while giving the answer.

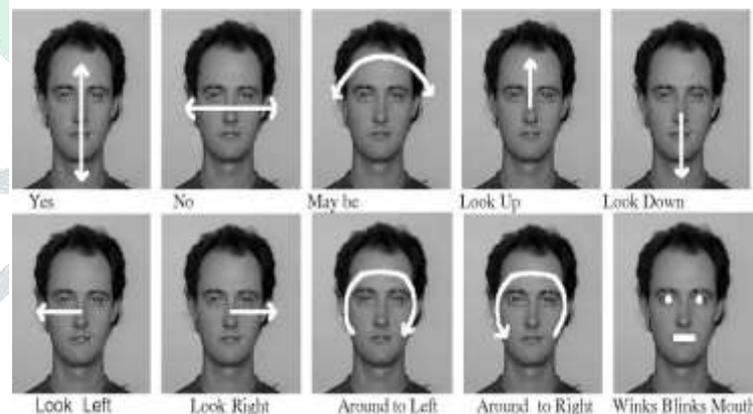
2.OVERVIEW

Our system is designed to build a web portal for technical interview which will verify the accuracy of responses given by candidate and simultaneously track the eye movements of candidate to detect any kind of misbehaviour. Along with this the confidence level of candidate can also be detected through the eyeball and posture movements.

2.1 Facial Gesture Recognition

Facial expressions determine the emotions and used in non-verbal communication process. Emotion recognition is the process of determining emotions through facial expressions. Different emotions types are detected through facial expressions, body movement and speech.

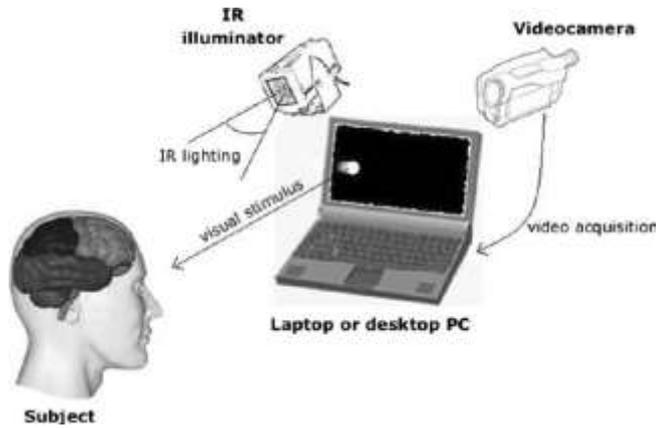
In our system, we can track the facial movements of the candidate and check how many times the candidate is peeping out of the screen.



2.1 Eye tracking

Eye tracking is the process of measuring the movement of eyes with respect to the head. This process is carried out by eye tracker which records the positions of the eye and the movements they make.

Screen-based eye trackers require the candidate to sit in front of the screen for interaction. These devices are helpful to track the eye movements within a certain limit only.



2.3 Natural Language Processing

Natural Language Processing is a field of Artificial Intelligence that is the ability of computer to understand human language as it is spoken.

Text comparison is done to check whether the responses given by candidate during the interview are correct. The responses are compared with the correct answers in database.

3. OBJECTIVE

The proposed system will present a technical interview portal through which the candidate can login to the test after verification. The system will track the posture and eye-ball movement of the candidate to check for any misbehavior by the candidate as well as determine the confidence level during the test.

Major asset is eye tracking which identifies the state of a person during interview. Frequent blinking of eyes and continuous eye movements depicts lack of confidence.

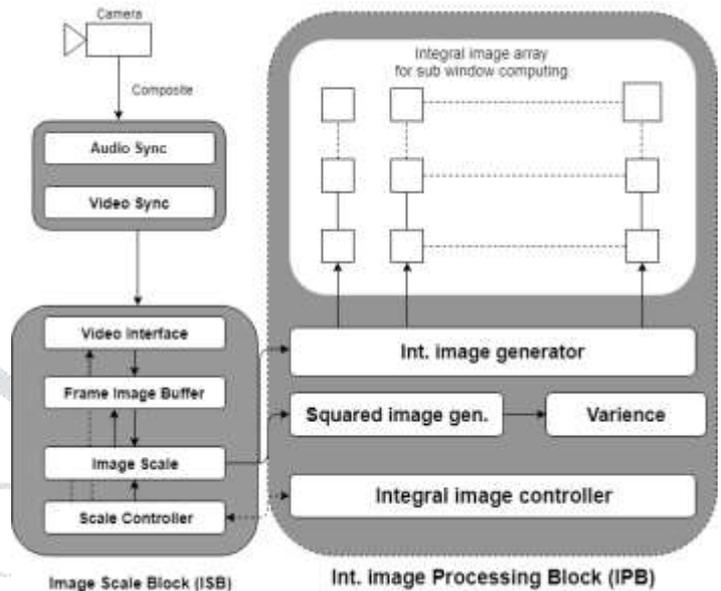
4. METHODOLOGY

Different methods used in proposed system are face detection, eye tracking and using NLP which will verify the accuracy of responses given by the candidate. The proposed system web portal for technical interview will firstly proceed with detecting face of candidate, movements done by face are converted into digital database using camera and other capturing devices which gives the next method the eye location to track it.

Eye tracking is used because the movements of eyes also give the current feeling human is having, sudden movements of eyes means panic or fear, not making eye contact means the person is not confident or distracted. During real life interview all these things are measured by the interviewer, in virtual interview's same things are done using technologies so that a perfect candidate can be selected for job.

NLP also plays important role in proposed system as the answer's given by the candidate will be in text form and to crosscheck or verify the accuracy of the answers with the answer's which will be already given in the database.

5. SYSTEM ARCHITECTURE



The proposed system architecture can be divided into subparts: Image scale block and Image processing block.

6. LITERATURE SURVEY

6.1 3D surface exhibited in facial expressions

In the current research, it was found out that face is like a flat pattern, like 2D shape associating different textures. Measuring an image-based face is easy as it has no different expressions and measuring a dynamic i.e. moving image is hard cause the face can move, change, expression and also it will be hard than static image to constantly track co-ordinates [1]. A dynamic image is measured in the 3D surface as a dynamic image can be considered as a 3D moving object. In 3D facial tracking not only, expression tracking is difficult but also constantly tracing co-ordinates of the face.

6.2 Facial Interest Points

A face can be converted into the set of coordinate points, an expression change is observed by the change in those co-ordinates. Consider coordinate P1 and P2, P1 is before smile and P2 is after smile, P1 has (P1x, P1y, and P1z) co-ordinates, these three coordinates which change their position and these coordinates will become (P2x, P2y, P3z) these change in coordinate determines the expression of face. Face is firstly converted into coordinates and the according to those points a set of expressions are given in database to quickly identify the current expression of a face. [2]

6.3 Vision Based Facial Expression Recognition

In the past years, analysis of facial expression if humans have gathered a lot of interest in machine vision and areas like artificial intelligence to build a system which will identify or understand and use this non-verbal form of human communication [3]. It is easy for a person to identify other person's facial expression but a machine cannot identify. Designing a kind of machine which can identify facial expression has attracted a lot of interest. Most of the systems that can automatically identify facial expressions can be classified in two categories:

- 6.3.1 System that identifies facial expression based on emotions
- 6.3.2 System that identifies facial expression based on facial actions.

6.4 Parametric Feature Representation

The outline of the facial features, generated or obtained by some facial identification methods is used for further analysis of facial gestures [4]. First carry out point of features and it can be taken out in two assumptions:

- 6.4.1 Facial images which are there are non-occluded and in front side view or face front view.
- 6.4.2 The first frame is in neutral expression.

We extract 22 point of reference: 19 facial point features, 2 represent center of eyes and last 1 represents middle point between nostrils.

6.5 Morphological Filtering

In real life there are so many objects which have same color as skin color, if a person is sitting next to an object having skin color might cause the system to include that object in facial tracking. Similar color is one thing and the other problems are background noise and missing pixels. Morphological filtering reduces the image noise in the background and also fills out the missing pixels in the image [5]. There are commands of morphological filtering which we can use to avoid all this problem causing device not able to detect human face. Low megapixel cameras and devices which have heavy amount of image noise or blur image are the regions where morphological filtering cannot work properly.

6.6 Head Tracking

Fitting a curve with the initialization process in every frame is not a reliable source and not a consistent one as well since individual points in visual motion are most often broken down in time [6]. Strong tracking requires continuous updating of parameters of the curve of contour or curve of outline of facial detection. Kalman filter is applied to model the continuous dynamic movements of curve in order to provide an accurate estimated facial position. Kalman filter is recurring or recursive and also linear optimal filter for proper estimation of dynamic positioning of face.

7. CONCLUSION

We have presented a method to conduct technical interviews online which will check the answers given by the candidate and determine the confidence level of the candidate by tracking the posture and eye-ball movements and provide the results after the test instantly.

Existing systems conduct tests online but they don't keep a track on the candidate, whether the candidate is being honest throughout the test. Our system will disqualify the candidate on any attempt of misbehavior.

This system will design a test portal which will be efficient to detect the confidence level of the candidate and will avoid any kind of malpractices.

This system can be further extended to verify the correctness of responses by speech to text conversion.

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