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Identification of Teacher Interaction in Online Class

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Abstract: ***The system investigate teacher's instructional activities from live audio of online class. The system is trained using python to identify the occurrences of eight key instructional activities from teacher audio. The system was able to identify eight key instructional activities using speech recognition techniques with an eye towards providing automatic feedback to teachers. One advancement in the field of automation is the Automated Attendance system replacing the old and traditional attendance marking.***
This system is based on the face detection and face recognition algorithms. The concept of this paper is to provide real time teacher attendance to the faculty's data base. Automatically detects the teacher face using the web camera and detect the facial part using Haar cascade algorithm and the image undergoes the various techniques and will compare with reference image, Later the attendance of the teacher is updated .Thus with the help of this system time will be saved and it is so convenient to record the attendance at any time throughout the day.

I. INTRODUCTION

The student-teacher interaction is a key factor for students to have a strong engagement in class. Face-to-face learning activities involve multiple interactions between students and teachers. These interactions provide insight into their level of participation in the educational activity. As a result, reading the interactions in a classroom yields relevant data for quantitative and qualitative evaluation of their performance.
Automated learning analytics is becoming important in the educational sector, which requires an efficient system to track student teacher interaction and provide feedback to the institution. This study is part of a large multidisciplinary project that analyzes classroom instructional practices towards the goal of automatic analysis of classroom discourse. The automation of such analysis would lead to the development of a teacher model, for use in personalized assessment and professional development. In line with this, here an approach is presented to automatically identify key instructional segments (e.g., Question & Answer or Notes taking) in live online class based solely on audio of teachers' speech.
The attendance system has an important role in the educational process both online and face-to-face learning. Many attendance recording systems were widely developed using biometrics, face recognition, iris recognition, and fingerprint recognition. The objective of our proposed system is to create a face recognition based teacher attendance system. This system includes detection of the human face through web camera where detection of the face is done using the Haar cascade Algorithm. The recognition of the teacher is done using a "LBPH"(Local Binary Pattern Histogram) Algorithm. It is robust against monotonic grayscale transformations. This System even detects and saves the images of any unknown person whose information is not there in the database.

II. PROPOSED SYSTEM

In the first phase of proposed system, the system aim to capture the following eight types of well-studied dialogic instructions that (1) motivate students and make them feel easy about the class: greeting and commending, (2) to help students understand learning materials and retain them: topic discussion, assessment, repeating, and Q&A, and (3) to build effective learning habits: note-taking and summarization and further in the second phase, the proposed automated attendance management system is based on haar cascade for face detection and the LBPH algorithm for face recognition. Graphical User Interface (GUI) for this system was created to input the teacher ID and name using python module Tkinter which is the fastest and easiest way to create a GUI application. This system provides functionalities such as taking images of teachers along with their details for the database, training the images in the database and recognizing the faces.

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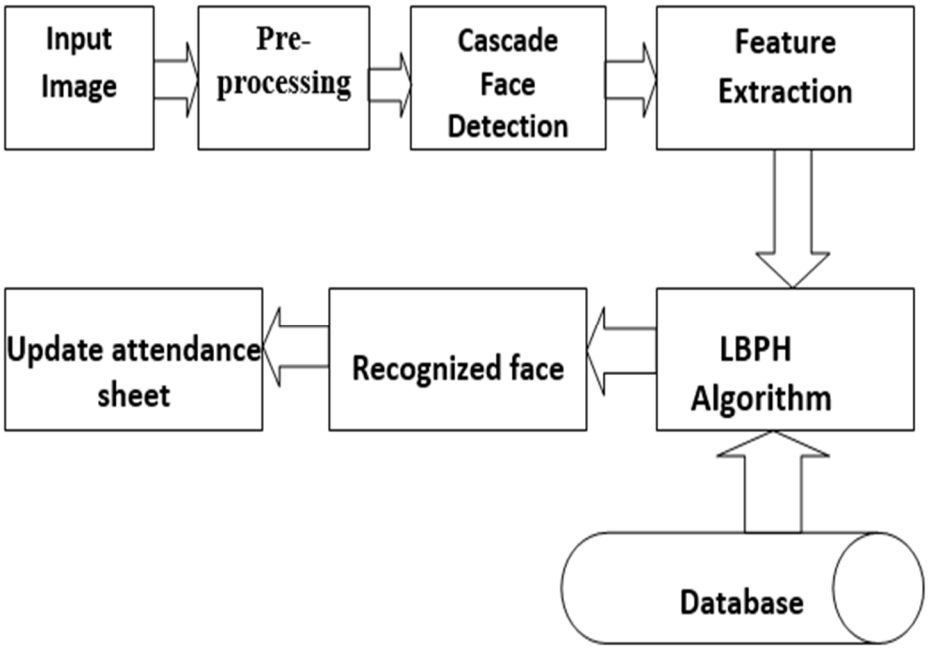


Fig .1. Block diagram of Face Recognition Process

III. METHODOLOGY

The system first converts the frame from color to grayscale. To detect the faces we have used a haar cascade classifier where a cascade function is trained and detect features in other images.

For this, we use haar features like edge, line, and four-rectangle. For a large image or variable size of an image, it takes a lot of computations and features and most of them will be irrelevant. But AdaBoost manages to select the best out of many Then Region of Interest (ROI) i.e containing faces is extracted and sent to next stage.

For face recognition, the LBPH algorithm is used because of its robustness, the capability to recognize both front and side faces and better compared to Eigenfaces and Fisherfaces. The LBPH algorithm is used as they find characteristics that best describe a face in an image.

They were many face recognition algorithms and the LPBH algorithm is better. This method is easier, within the sense it characterizes the image within the dataset locally and when a replacement unknown image occurs we perform an equivalent algorithm and compare the result to each of the pictures within the dataset. It even works better in different environments and light conditions than other algorithms.

The process of speech recognition starts by taking the sound energy produced by the person speaking and converting it into electrical energy with the help of a microphone. It then converts this electrical energy from analog to digital, Once the digitalization process is completed several models can be used to transcript the audio data to text data.

Here automatic Speech Recognition (ASR) is used to transcribe the speech which is the necessary step in processing speech. In ASR, speech spoken to a microphone is processed and converted to text, therefore it is also known as Speech-to-Text. Then this text is fed to a Natural Language Processing to understand and extract key information (such as keyword spotting, sentiments), and then appropriate action is taken and live speech recognition is done using python that takes input from the microphone, converts it and after converting speech to text, if pretrained keywords are present in that text then excel sheet will be updated one with respect to their corresponding titles and then updated excel sheet is assessed using some basic formula to give overall evaluation result in percentage.

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IV. RESULT AND DISCUSSION

A face recognition system was created and tested. Fig. 2 shows the initial display contains button and input boxes. The application needs a computer with webcam to capture the face image.

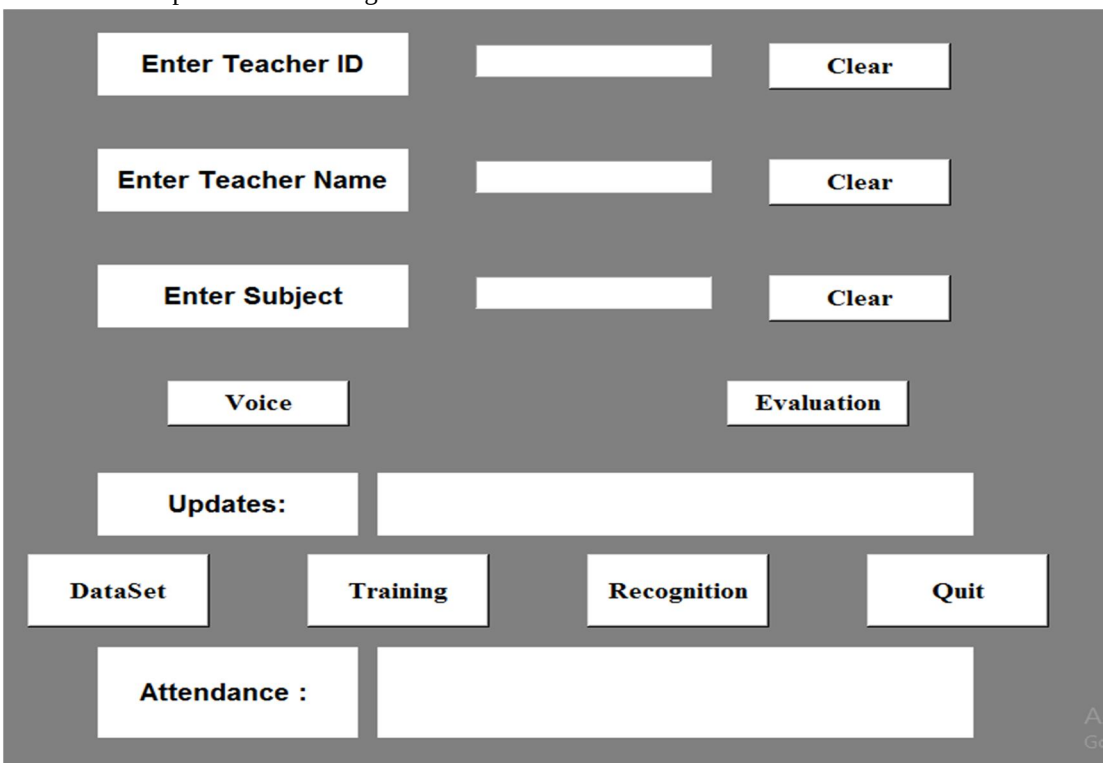


Fig. 2. System GUI

Fig. 3 and 4 shows the face matching with the stored database. The information can be shown near the face boxes with the text contains ID, name and subject of the teacher. The proposed system used both matching and recognizing. Whereas the matching part used histogram similarity, the recognition process can detect the name of the student according the captured face image.

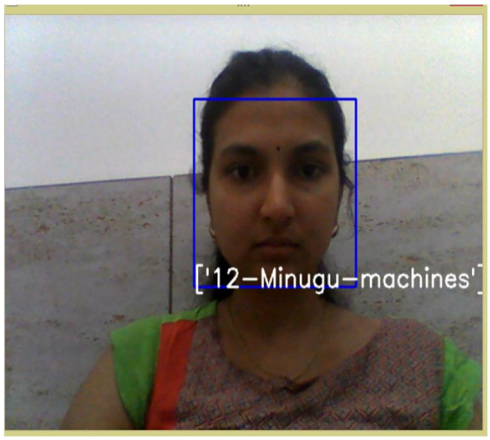


Fig. 3. Recognizing the faces

Id	Name	Subject	Date	Time
12	['Minugu'	['machine	6/23/2022	11:50:55
5	['Padmaja	['Maths']	6/23/2022	11:50:57
4	['Nisarga']	['biology']	6/23/2022	11:51:20
7	['Sohan']	['Digital']	6/23/2022	11:51:21

Fig.4. Attendance updated in the Excel Sheet

The system automatically identify eight key instructional segments or activities (e.g., Q&A or notes taking) in online class based solely on audio of teacher's speech and live speech recognition is done using audio input from our microphone and after converting speech to text, if already predefined keywords are present in that text then excel sheet will be updated one with respect to their corresponding titles and then updated excel sheet is assessed using some basic formula to give overall evaluation result in percentage.

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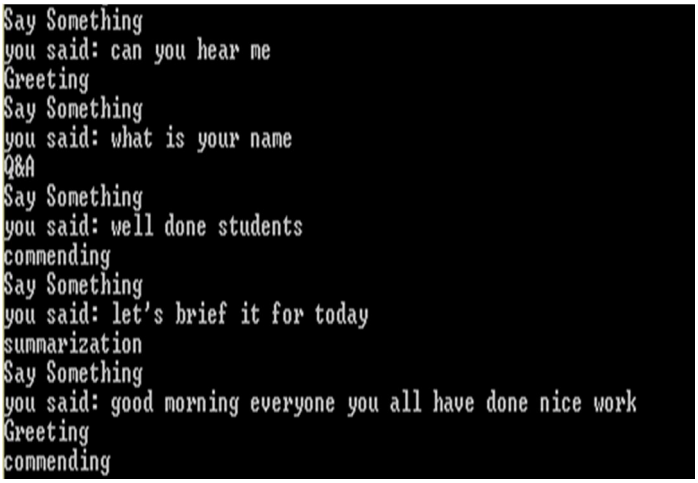


Fig. 5. Voice Input

	A	B
1	Title	Update
2	Greeting	1
3	Topic	0
4	Q&A	1
5	Notes	0
6	Commenc	1
7	Assessme	0
8	Repeating	0
9	summariz	1
10		
11		

Fig. 6. Updated excel sheet

Subject Results

web	25.0
web	12.5
cmos	75.0
digital	12.5
web	12.5
power	25.0
web	50.0
machines	87.5
Analog	50.0

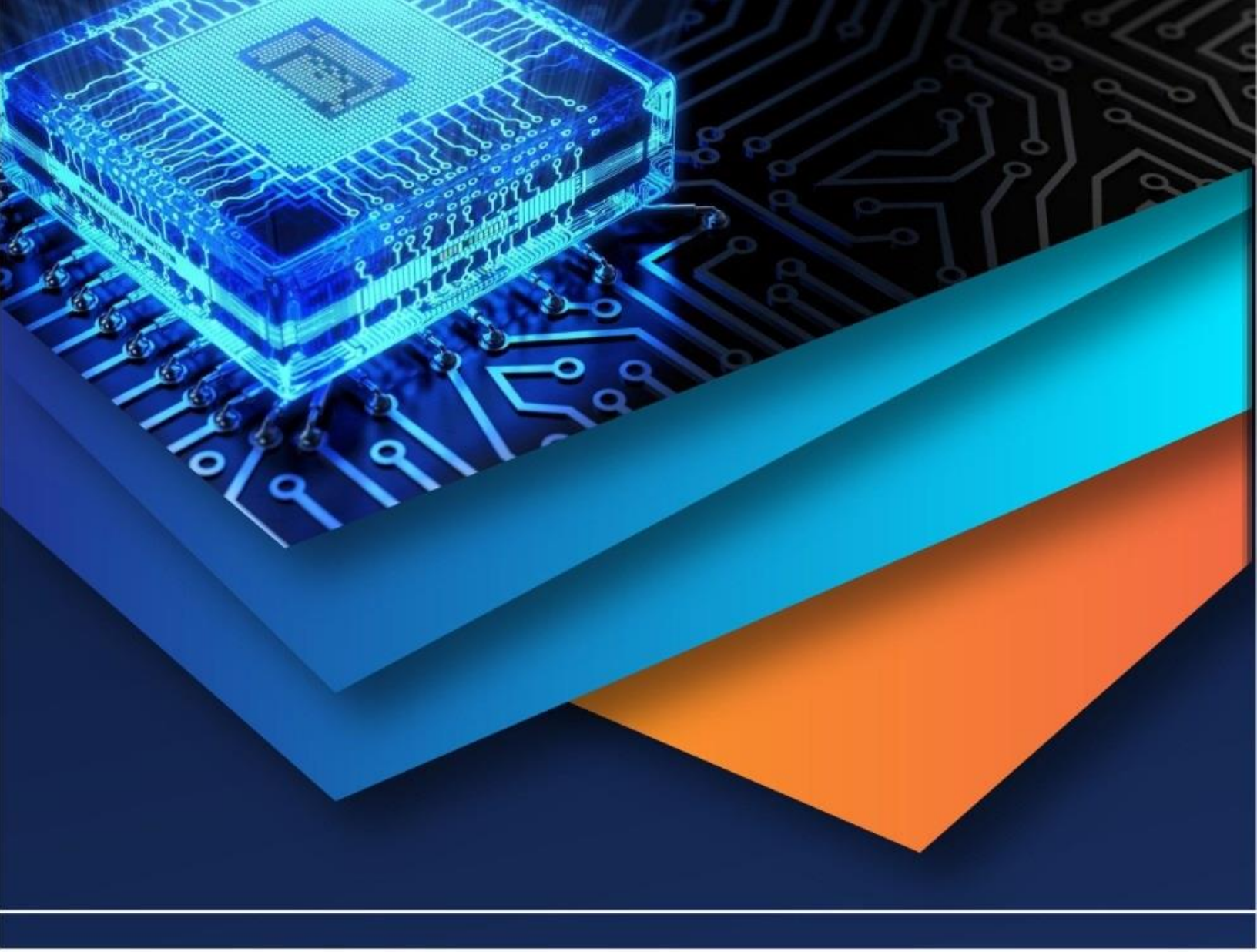
Fig. 7. Evaluation results

V. CONCLUSION

The system for automatically marking and storing the attendance of the teachers has been implemented. Implemented process includes entering data of the teachers, training dataset, recognizing faces and marking attendance automatically. Haar cascade algorithm is used which is robust and has high detection rate .LBPH algorithm is used as face recognition algorithm because of its effectiveness in feature extraction and fast computational time as well as lower sensitivity to noise. And identifying teacher's interactions is done with the help of eight key instructional activities. The main purpose of identifying the interactions is to generate feedback to teachers, enabling reflection and improvement of their pedagogy, ultimately leading to increased student engagement and achievement

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