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Visual Evaluation Based Analysis in Classroom Environment

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Abstract: *To overcome the shortcomings of current classroom evaluation methodologies, a teaching effectiveness evaluation strategy based on computer vision technology is being developed. Attendance is determined by using face detection. The curve fitting approach is used to objectively assess the seat selection distribution. The head-up rate of students raising their heads and good feelings are determined using head posture estimation technology and facial expression recognition technology to assess students' up or down state and expressions, respectively. Finally, to analyse the teaching effect, a geometric mean function based on attendance, seat attendance detection, head up rate, and the proportion of happy sentiments is provided. The experiment findings show that this method's evaluation results are quite close to those of teachers and pupils.*

Keywords: Computer Vision; Seat Selection Distribution; Attendance; Head Up Rate; Positive Emotion

I. INTRODUCTION

Facial expressions are an important part of human communication. Facial expressions are employed to communicate essential communicative cues during social interactions, such as our level of interest and continual feedback signalling understanding of the information delivered. Real-time system for video recognition of basic emotions. The system recognises frontal faces in video streams and codes each frame in four dimensions: neutral, anger, happiness, and sadness. The basic emotions are mapped to the facial features retrieved from the video source. This can be used in any kind of environment. We utilise this technology in the classroom to track student participation during lectures. We can investigate the behaviours of the students using these expressions. Students' participation can be gauged by them facial expressions. Faces speak louder than words, and they are more effective in conveying messages. The majority of Traditional teaching effect evaluation methods, such as instructor classroom observation and after-class questionnaire surveys, use qualitative analysis to determine students' classroom learning impact. To acquire measurable statistics, examine students' classroom learning impacts. Both of the above procedures make use of a manual or automatic record, and the evaluation findings are very subjective and out of date. As information technology progresses, classrooms are becoming more outfitted with cameras. The installation of classroom monitoring technology is intended to aid relevant personnel in gaining and comprehending critical classroom information. It is used to track whether students cheat on exams and how students and lecturers behave in the classroom during normal classes, for example. As a result, discovering how to use classroom surveillance video to objectively and scientifically evaluate students' classroom learning status is crucial for analysing the effectiveness of classroom instruction.

II. Problem Statement

The problem of face recognition can be stated as follows: Face Recognition human facial features. We will be adapting a multi-step process in order to achieve the goal. To detect the face region, from automatic face recognition which consists of subtasks in sequential manner: face detection, face segmentation/normalization and face recognition/verification of the face will be obtained from which face contour points could be extracted. And we will also be adapting contactless attendance

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system which helps in many ways and this auto attendance may help teachers to easily maintain attendance database of the students.

III. Proposed System

We used certain algorithms to make contactless attendance where the data are stored. The attendance is detected through face recognition. And also, this system helps in detection of facial emotions. Head-up rates of the students are shown. This project not only used for classroom environment it can be used in all fields such as online/live proctoring, etc.

IV. Objectives

- To experiment machine learning algorithm in computer vision fields.
- To make auto attendance system.
- Classify the emotions based on facial input and calculate interactions in classrooms.
- Classify the head-up rates.

V. System Requirements

5.1 Hardware Requirements

A. System Hardware: Intel i3/i5/i7

The Core i3, i5, i7 Processor from Intel has a base clock speed of 3.7 GHz,3.60GHz and 3.90GHz respectively and comes with features such as Intel Hyper-Threading technology (Note: processor should be i3 or more than i3).

B. Hard Disk

Hard Disk requirement should be **500GB or more**, Hard Disk helps in processing the project faster and hard disk is the primary computer storage device and is used to store files on the computer

C. RAM

RAM (random access memory) temporarily stores the computer's operating system, application programs and current data so that the processor can reach them quickly. Ram is a faster memory and volatile in nature i.e., when the power is switched off, the data in this memory is lost.

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D. Webcams

A webcam is a type of video camera that transmits or streams an image or video in real time to or through a computer network, such as the Internet. Webcams are tiny cameras that can be placed on a desk, attached to a user's monitor, or embedded into the hardware. With live audio and video conversations, webcams may be used during a video chat session between two or more people. Webcam software may be used to capture or transmit video over the Internet. Because video streaming over the Internet requires a significant amount of bandwidth, compressed formats are frequently used. Because larger resolutions would be lowered during transmission, the maximum resolution of a webcam is lower than the maximum resolution of most portable video cameras. Because of their lesser resolution, webcams are less expensive than most video cameras, yet the impact is sufficient for video chat engagements.

5.2 Software Requirements

A. Operating System

An operating system is a piece of software that serves as a bridge between a computer's user and its hardware. It is a piece of software that handles computer hardware and lets the user to run programmes quickly and easily.

B. Software Tool: Open CV Python

The term "open-source computer vision" refers to software that is available for free. It was designed to provide an uniform architecture for computer vision operations and financial product system behaviour. Image processing, facial recognition, video recording, searching, and object disclosure are some of the topics it concentrates on.

C. Coding Language: Python

Summary of the report Python is a dynamically semantic, interpreted, object-oriented high-level programming language. Its high-level built-in data structures, in combination with dynamic typing and dynamic binding, make it ideal for Rapid Application Development and scripting.

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D. Toolbox: Image Processing Toolbox

For image processing, analysis, and visualisation, the Image Processing Toolbox includes a range of functions and applications. Image analysis, picture segmentation, image enhancement, noise reduction, geometric transformations, and image registration can all be done with a variety of functions.

VI. System Design

6.1. Use case diagram

In the UML, a use case diagram is a dynamic or behaviour diagram. Actors and use cases are used to model the functioning of a system in use case diagrams. A set of tasks, services, and functions that the system must do are referred to as use cases. A "system" in this sense refers to something that is being produced or operated, such as a website. The "actors" are persons or things that perform certain functions within the system.

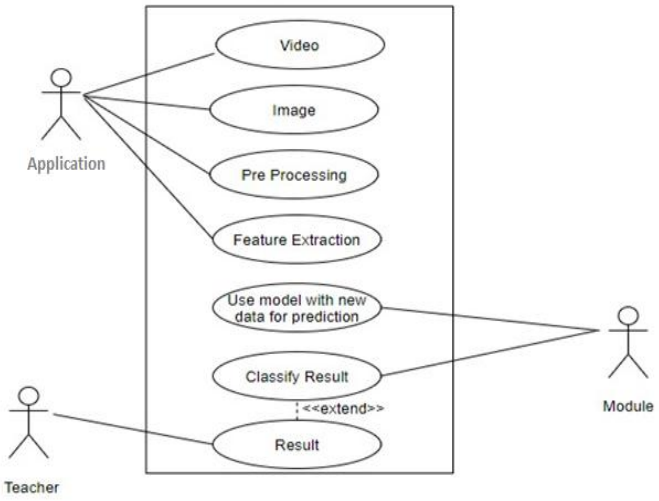

Figure 4.1: Use case Diagram

6.2 Sequence diagram

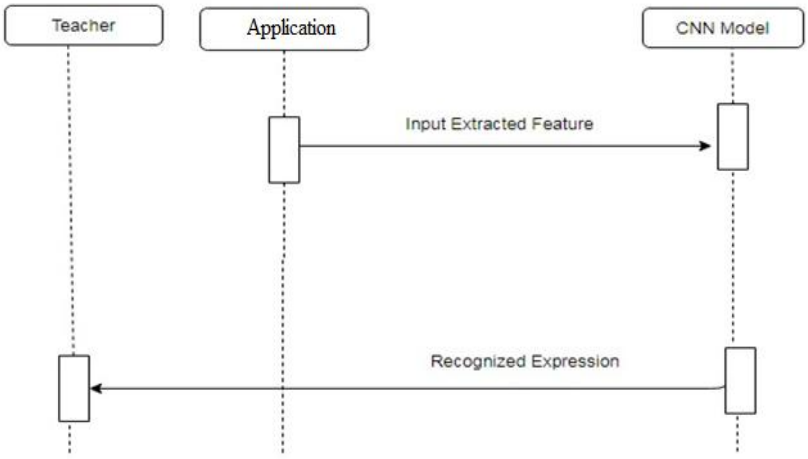

Figure 4.2: Sequence diagram

A sequence diagram depicts item interactions in chronological order. It illustrates the scenario's objects and classes, as well as the sequence of messages sent between them in order to carry out the scenario's functionality. In the Logical View of the system under development, sequence diagrams are often related with use case realisations.

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VII. System Architecture

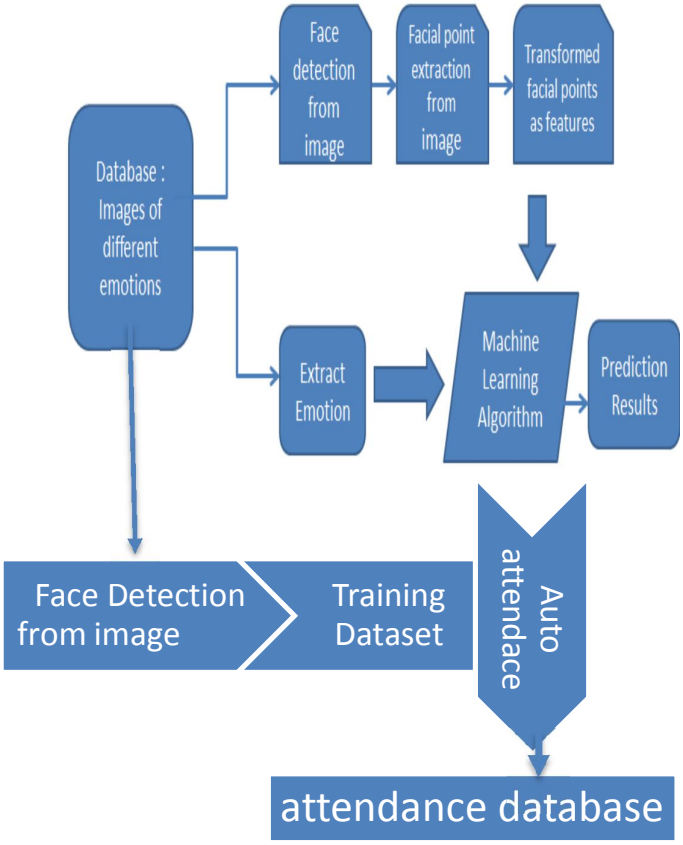

Figure 7: System Architecture

7.1. Phases in Facial Expression Recognition

The facial expression recognition system is trained by taking photos of various facial expressions and utilising a supervised learning approach. Picture acquisition, face detection, image pre-processing, feature extraction, and classification are all part of the system's training and testing phase. Face detection and feature extraction are performed on face photos, followed by classification. The head-up rate is discovered by facial features. This head-up rate is used in a variety of ways, including assisting teachers in proctoring students in tests. This head-up rate feature is also employed in other fields. Also, with image processing, automatic attendance is identified and maintained in a database sheet.

7.2 Image Acquisition

Static images or image sequences are utilised to recognise face expressions. Face images can be obtained with a camera.

7.3. Face detection

Face detection is useful for identifying a person's face. Face detection is performed in the training dataset using the Voila-Jones face detector, a Haar-cascade classifier implemented in OpenCV. The difference in average intensity in different sections of the image is encoded using Haar-cascade type features, which are made up of black and white connected rectangles with the value of the feature being the difference of the sum of pixel values in black and white regions.

7.4. Image Pre-processing

Image pre-processing includes the removal of noise and normalization against the variation of pixel position or brightness.

- Color Normalization
- Histogram Normalization

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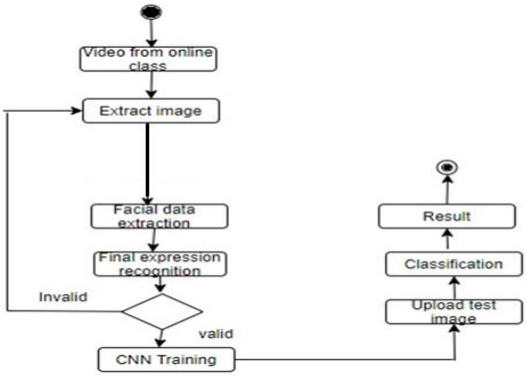
VIII. Activity Diagram

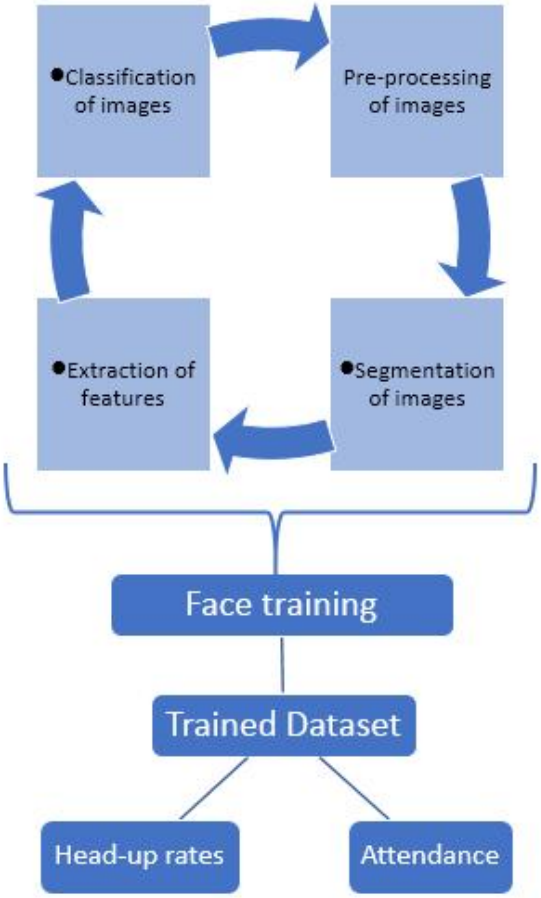
The activity diagram is a UML diagram that depicts the dynamic aspects of the system. It is, in fact, a flowchart that controls the flow of each event. The system's operation can be described as the event. Between operations, the control flow must be followed.



8.1 Feature Extraction

In a pattern classification task, the feature vector selection is the most crucial step. After pre-processing, the image of the face is used to extract the relevant features. Scale and posture are two fundamental challenges with image classification.

IX. Implementation



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Implementation mainly consists of:

1. Image Collection
2. Image Pre-processing
3. Image Segmentation
4. Feature Extraction
5. Training
6. Classification

A. Image Collection

Classification of CT Scan images, which are images taken, provides an input to the proposed system. It's a type of magnifier that's used to photograph CT scans.

B. Image Pre-processing

The goal of pre-processing is to improve image data by reducing undesirable distortions and enhancing some critical image properties for further image processing. There are three main aspects to image pre-processing. a) Gray scale conversion b) Noise removal c) Image enhancement.

a) Grayscale conversion

The only information in a grayscale image is brightness. In a grayscale image, each pixel represents an amount or quantity of light. In a grayscale image, the brightness gradient may be distinguished. Only light intensity is measured in a grayscale image. The brightness of an 8-bit image will range from 0 to 255, with '0' representing black and '255' representing white. Grayscale conversion converts a colour image into a grayscale image, as seen in fig. 2.2. Coloured photos are more difficult and time consuming to process than grayscale images. On a grayscale image, all image processing techniques are used. The X-Ray image is transformed to grayscale in our proposed approach.

b) Noise Removal

Noise removal is the technique of detecting and removing unwanted noise from a digital image. The difficulty is discerning which features of an image are real and which are attributable to noise. Noise is defined as erratic fluctuations in pixel values. A median filter is used in our proposed approach to decrease unwanted noise. The median filter is a nonlinear filter that keeps the edges in place. To implement the median filter, a sliding window of odd length is utilized. Each sample value is sorted by magnitude, and the filter output is the window's median.

c) Image Enhancement

The goal of image enhancement is to improve the visibility of a feature of interest in a photograph. To achieve a higher quality outcome, contrast enhancement is performed.

C. Image Segmentation

Following image pre-processing, the Bone Tumor region was segmented from the surrounding CT images. To improve segmentation, a black and white image was created with the contrast altered.

D. Feature Extraction

In order to extract information from a given image, feature extraction is crucial. For texture picture analysis, we're utilizing GLCM. The GLCM method is used to record the spatial relationship between image pixels. Most popular features as contrast, entropy, energy, homogeneity, correlation, ASM, and cluster-shade are captured by GLCM, which works on grey level image matrices.

E. Training

Create a training dataset using photos of cancer types that are well-known. On the newly constructed training dataset, train classifiers. In a temporary folder, create a testing dataset. Predict the outcomes of the test cases. Graphs of classifiers To improve the accuracy of image processing models, add feature-sets to the test case file.

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F. Classification

Convolution Neural Network is a binary classifier that use the hyper-plane, often known as the decision border between two classes. Pattern recognition, such as texture categorization, is one of the problems that CNN is employed to address. In CNN, translating non-linear input data to linear data allows for accurate classification in a high-dimensional space. CNN maximises the shortest distance between multiple classes. Different Kernels are required to separate the classes. SVM stands for support vector machine, and it is a binary classifier that determines the hyperplane when dividing two groups. The boundary is maximised between the hyperplane and two classes. The support vectors are the samples closest to the margin that will be utilised to calculate the hyperplane.

X. APPLICATIONS

- Early detection of student behaviour in online classes.
- To be implemented in other fields like Metro-stations,
- Airports, Online exams, Banks, Military services, etc.
- It can be used in detectioning the emotions of the students and taking the feedback from them.
- This can be used to detect and track a student's state of mind.
- It can be used in contactless attendance systems.

XI. CONCLUSION

This project provides a method for recognising facial expressions as a category. Face detection and emotion extraction from facial photos are valuable in a variety of applications, including robotic vision, video surveillance, digital cameras, security, proctoring, airports, driving, and human-computer interaction. The goal of this study was to create a facial expression recognition system that used computer visions while also improving advanced feature extraction and classification in face expression recognition. This study also presents a method for detecting student attendance using facial photographs contained in the training data set. Attendance isn't just for students; it may be utilised in a variety of settings. This initiative also aids in the detection of students' and others' head-up rates.

. REFERENCES

[1]. TANG K, XIAN Q, LI M Y. Study on classroom Attention in university based on Face Detection [J]. Journal of Chongqing Normal University (JCR-SCI), 2019, 36(05):123-129.

[2]. HOU L G, WANG Y, ZHANG S E, FAN FW, LUO Q M. Application of Face Detection technology in Reaching evaluation [J]. Electronic World, 2016(24): 37-38.

[3]. HAN L, LI Y, ZHOU Z J, SONG P X. Analysis of teaching effect based on facial expression in classroom environment [J]. Modern Distance Education 2017(04) 97-103+112.

[4]. Li Jian. Research on real-time intervention method of Negative emotion infection in classroom Based on computer vision [D]. Jilin University, 2020.

[5]. Pei, J.Y., Shan, P. A micro-expression recognition algorithm for students in classroom learning based on convolutional neural network. Treatment du Signal, 2019, 36 (6): 557-563.

[6]. YU K H, DENG D F. A Survey on College English Classroom Seat Selection and Learning Status Differences of Non-English majors: A case study of Guangxi Normal University for Nationalities [J]. Journal of Shaanxi Pre-school Normal University, 2015, 31 (02):16-19.

[7]. LI J. Research on real-time Intervention method of Negative Emotion infection in classroom based on computer vision [D]. JI LIN University, 2020.

[8]. WANG Z G. Fuzzy ranging and map construction based on image recognition [D]. Southwest Jia tong University, 2019.

[9]. YUAN Y T. Based on monocular vision, intelligent vehicle front obstacle identification and ranging [D]. Jilin University, 2016.

[10]. Kwon, D., Reddy, R. R. S., & Reis, I. M. (2021). ABCMETA app: R shiny application for simulation-based estimation of mean and standard deviation for meta-analysis via approximate Bayesian computation. Research synthesis methods, 12(6), 842-848.

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[11]. Singh, P., Williams, K., Jonnalagadda, R., Gogineni, A., & Reddy, R. R. S. (2022). International Students: What's Missing and What Matters. Open Journal of Social Sciences, 10(2), 381-397.

[12]. Lu, N., Butler, C. C., Gogineni, A., Sarmiento, J. M., Lineen, E. B., Yeh, D. D., ... & Byers, P. M. (2020). Redefining Preventable Death—Potentially Survivable Motorcycle Scene Fatalities as a New Frontier. Journal of surgical research, 256, 70-75.

[13]. Sarmiento, J. M., Gogineni, A., Bernstein, J. N., Lee, C., Lineen, E. B., Pust, G. D., & Byers, P. M. (2020). Alcohol/illicit substance use in fatal motorcycle crashes. Journal of surgical research, 256, 243-250.