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AI/ML BASED SMART ATTENDANCE, STUDENT PERFORMANCE AND QUESTION PAPER SETTER

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Abstract— The initiative focuses on setting the question papers, predicting performance, and attendance. It enables professors to simply keep track of student attendance and performance, and the time used for recording attendance is put to good use when discussing issues. With the aid of teachers and using past year's question papers, a question paper for the internal assessment exam can be automatically prepared. The user's manual sheet work is reduced thanks to the system. Proper data must be studied and analysed in the modern day. The obtained information may be used in monitoring systems in businesses, hospitals, colleges, and other institutions. In this project, we provide a framework for recording attendance in schools and colleges, streamlining and streamlining the laborious process of recording and calculating attendance. As educational institutions are its primary target market, they need an automated system that is economical, user-friendly, portable, effective, and secure. As a result, this prototype offers a mix of all necessary targets. The main benefits are its extremely low cost, compact size, and energy-efficient performance. Researchers now have a unique opportunity to analyse how students learn and what methods of learning result in success thanks to newly created web-based educational technology. Web-based systems commonly gather quantitative data on user behaviour, and these databases can be mined using data mining techniques. This study describes a method for categorising students in order to forecast their final grade using attributes taken from activities reported in a web-based educational system and preserved in the prior records.

Keywords: Computer Science Education, Student Performance, face recognition, automated attendance, Question paper setter.

I. INTRODUCTION

Maintaining each student's attendance and achievement is a highly challenging undertaking in a school. The majority of institutions collect attendance manually, and the problem of some students using proxies can be resolved by facial recognition. The system will set the question paper from the teachers' question bank or set by looking at the previous year's question papers. Setting the question paper can be a laborious task for teachers that must be repeated over and over again.

The goal of many prestigious educational institutions is to create an online presence for teaching and learning. To deliver online education in an academic setting, numerous systems have been built with various capabilities and methodologies. In particular, Michigan State University (MSU) was a pioneer in developing several of these tools to support online education. The Learning Online Network with Computer-Assisted Personalized Approach, the newest online educational system created at MSU, served as the subject of the research presented here

(LON-CAPA)

Machine learning implementations have increased dramatically over the past few years as a result of the development of computational frameworks, particularly Graphical Processing Units (GPU) embedded processors. This growth has led to the advancement of novel methodologies and designs, which has now given rise to a new classification, Deep Learning. Instead of the "swallower" topologies used in more standard neural network technique, deep learning uses artificial neural network structures with multiple functional layers.

The detection of the face is the initial stage in facial recognition. For this, two distinct face detection algorithms—the Haar-Cascade [02] and the Bar Chart of Minded Gradients [01]—were constructed, and their performances were compared.
The difference in several regions of AN snapshots is what drives the barchart of mind gradients (HOG) approach. The main advantage of this approach is that gradients are hardly ever affected by lighting, whether added or lost. Assuming that f(x, y) represents the shade of the greyscale image for each detail in the component region (x, y), the gradient vector represents the colour differentiation between the adjacent pixels in each coordinate axis and coordinate axis and may be calculated as follows:
F(x, Y) = F(x, Y) = F(x + 1, Y) F(x, Y 1, Y) F(x, Y + 1) F(x, Y 1)
Using (f x)2 + (f y)2 and tan1 f y f x, separately, it is possible to calculate the amplitude and direction of the light gradient at each element. In the following step, the image is divided into several cells, each of which is made up of neighbouring, non-overlapping C-through-C pixels. A histogram of gradient orientations with B boxes is produced for each block. Overlapping blocks with 2-by-2 cell proximity are created during the block standardisation process, and the block feature b is created as follows:
B is equal to v ||v||2 * 2 + e (2),
Where v is the non-normalized vector of all the histograms in a particular block and e is a small constant used to prevent department-by-0. These options were thereafter utilised for the detection of the things, which in this examination were love faces. A different method is the hara-cascade, in which the transition between the light and dark areas is used to infer the type of options that are then used to spot objects such as lines, edges, faces, eyes, cars, etc. on a given image. Three different types of Haar-like algorithms are frequently employed to train face components when face detection is involved. These talents are positioned as supplied in parent one. The sum of the element values below the sunny space is removed at some point in this procedure from the sum of the detail values in the dark area.
using Haar-like options at certain locations with "different," "completely different," and "absolutely unusual" sizes It could take a lot of time and computational effort to simulate the locations and the associated calculations. Typically, a lift algorithmic programme is employed to alleviate this problem and to find the best solutions. This programme establishes a threshold price that can distinguish between good and bad images. Once the correct options are identified, the next stage is to classify the skills into completely different tiers and use them in a completely cascading manner one-by-one. A location will be rejected and the subsequent tiers won't be applied if it fails in one of the categories. Faces of various scales can be chosen by using the Haar-Cascade method. However, this technique's performance significantly changes with the creation of the top, and it is less resistant to occlusion.

Based on their performance on the final exam for the course, the students were divided into three groups: "fail" (n = 36), "pass" (n = 53), and "amazing" (n = 63). Students within the organisation "fail" failed the course (received less than 50% of the feasible score), students within the organisation "bypass" passed the course but received less than 90% of the feasible score, and students within the organisation "notable" received 90% or more of the feasible rating.
The data was transformed into a shape that might be utilised for classification at some point during the creation of the artworks. Similar to the label that distinguishes the group, every records object that corresponds to students' programming conduct is defined with close to 200 different features.
Minutes until closing date (MAX) is a property that can indicate excitement or exact planning skills in the student, both of which are positive traits. Students who begin working on path sports earlier are more likely to fall into the category of "first rate," but college students who start working later are more likely to fail the course.
Different superb signs had been e.g. the quantity of indentation mistakes within the code, which could indicate whether or not the scholar will pay recognize to minor info: college students that had low amount of

indentation mistakes in their code were much more likely to belong to the group "tremendous".

II. LITERATURE REVIEW

Predicting Students' Performance in an Introductory Programming Course using Data from Students' own Programming Process
Author: Arto Vihavainen
2013 IEEE 13th International Conference on Advanced Learning Technologies.

Despite the fact that programming has been a popular subject in school for many years, both professors and students frequently ignore real-world working practises and programming techniques. In our research, we evaluated students' programming systems and looked for clues that could be used to forecast success or failure in beginning programming classes. Our main goal is for you to identify college students who have terrible work habits so that you may develop treatments before they drop out of a course. Later, we'll be looking for features and characteristic combinations that show kids are engaging in "planned practise" of learning how to use a software. Finding variables that can be utilised to predict success or failure in a programming path isn't a novel concept. However, attempts to understand academic behaviour using programming suggestion logs have just recently attracted interest; see, for instance, [4]. In this work, we report current research into predicting students' final grades based on their programming behaviour as early as the first few lessons of a programming course, without the need for any prior historical data. The context of our investigation is described in the following stage, followed by descriptions of the statistics and tools we currently employ. Finally, we summarise the analysis and findings thus far.

Automated Student Attendance System Using Face Recognition
Authors: E. Omer Akay, K. Oguz Canbek, Yesim Oniz
Published in: JAMA, 2020.

Face detection and reputation systems were initially designed for use in public surveillance as a subfield of computer vision. However, the ever-declining size, increased computational power, and low cost of transistors lead to a boom in the variety and breadth of the packages of face reputation systems in daily life, business, and academics. In this study, a facial recognition device is created for recording student attendance. According to studies, effective learning and student retention are directly correlated with student attendance. In colleges and universities, there are many automated attendance systems in use, and they are extensively examined in the literature. Such a method involves using a finger print studying tool, which can be held in the hand or set up in front of the class. An RFID card is used in a similar manner to take attendance. Both strategies are time-consuming since only one student at a time can use the devices used in each. The RFID technology is also susceptible to fraud attempts because any student can use their partner's card in place of their own. applications Another option is to create the attendance list automatically using the Bluetooth conversation protocol, which can be done either by immediately using the Bluetooth connection of a student's mobile device or by applying specific Bluetooth tags or beacons. Since these methods need less time and are more accurate than their conventional counterparts, academic research on computer vision-based approaches to attendance taking has gained traction in recent years. In order to track down and comprehend the students as they enter the classroom and to write their names on the attendance list, photos obtained by a video digital camera positioned in the classroom are used. For a database of 80 people, the overall effectiveness of several feature extraction and classification techniques is evaluated. With an 82 percent success rate for a collection of 148 images of 16 people, the study uses discrete wavelet rework (DWT) and discrete cosine remodel (DCT) approaches for function extraction and radial basis function (RBF) networks for recognition. Face embedding is produced using Convolutional Neural Networks (CNN) in a series of layers to build features for the face recognition problem. Then, for a five-person dataset, an SVM is employed as a classifier with a 95% success rate. Meanwhile, an additional PCA approach is applied to the CNN feature extractor, and Mahalanobis distance is used as a classification method.

A Semi-Supervised Learning Approach for Predicting Student's Performance
Author: Yekti Widyaningsih
Published in: l2th International Conference on Information & Communication Technology and System (lCTS) 2019

Due to the fact that one of the criteria for a high-ranking institution is dependent entirely on its impressive record of academic accomplishments, student performance is an important component of higher learning organisations. Student performance can be gauged after the first 12 months. The student

duration in the first year of the lecture is a good approach to effect academic progress. The importance of the first year in higher education has been acknowledged as the crucial period between students' main success in earning a degree of completion because the first year plays a significant role in forming their attitudes and overall performance in the years that follow. The purpose of student grouping is to identify student variability based on performance in order to maximise coaching and learning activities for the group. The factors that are frequently used in classifying student performance include CGPA, scholarships, and student demographics like gender, age, and family history. They also include extracurricular activities, high school background, location, and psychometric factors like student hobby, mastering conduct, leisure time, and own family history. College students' performance is divided into three categories—low, medium, and high—using a semi-supervised learning technique. Semi-supervised learning is a branch of device learning that uses both labelled and unlabeled data with the concept of grouping and classification techniques. Unlabeled facts are grouped the utilisation of the clustering approach. using the grouping's outcome, the data may be identified as constituting a target or class designation. The data is evaluated when the statistics have a goal label or elegance. The following are studies that have been done on classifying student performance. Overlade and others. 2010, using polite language Comparing the overall academic achievement of students using a clustering set of principles. They are divided into three groups depending on their academic performance, and each group suggests distinct performance levels: high, medium, and low. According to Saurabh Pal et al. (2011), the Naive Bayes classification method may be ideal when the entry dimensions are high. The Naive Bayes model on this investigation identified the traits of college dropouts. For circumstances that are likely to occur, it suggests the potential of each input attribute. A simple probabilistic classifier with a strong assumption of independence, the naive bayesian class is based on the application of the Bayesian theorem. Shovon and co. 2012 offers a hybrid process that is depending on the choice. With the use of student assessment tools like quizzes, midterm, final assignments, and lab exams, lecturers are now able to expect the CGPA from their students using the Tree and K-means Clustering approach. K.Bashash et al2017 .'s study, which focuses on post-graduation students, predicted student success. The prediction system, which focused on student performance with many parameters, used a methodology called OK method Clustering and a help vector device. The students are split into three groups, and each group is then classified as high, medium, or occasional.

III. PROBLEM STATEMENT

Keeping track of attendance, student records, and question paper preparation is quite taxing.

Daily attendance taking takes up a lot of class time and is particularly error-prone since students may try to fool professors by using proxies.

As it would require more time and effort to assess each student's performance, activities, and habits, establishing strategies for their individual progress is also very inefficient.

Setting a question paper involves looking over previous question papers and choosing the ones that stand out the most.

So the following system is suggested to deal with this issue.

IV. PROPOSED SYSTEM

The system is made up of a camera that takes pictures of the students seated in the classroom and sends them to an image-enhancement module.

Images are improved in the image improvement module to make matching simple. The image is sent to the Face Detection and Recognition modules for refinement, and after that, the database is marked with the attendance information.

Templates of each student's facial photos are saved in the Face database at the time of enrollment.

In order to maintain track of the number of pupils present in classrooms, institutions, or other settings, attendance is used. And by maintaining this data, we can take the necessary precautions to stop any drifts. The next stage is to figure out how to take attendance. The traditional method of taking attendance involves calling names. The conventional approach is preferable since it is less expensive and authentic because it is carried out by humans. Other ways include RFID cards and biometric identifiers like fingerprint, face, palm, and iris recognition. However, it has a disadvantage because it adds to the complexity and workload. So, in order to avoid this complexity, our project offers a traditional solution. In addition, accurate student performance prediction is crucial for enhancing the calibre of instruction and for planning

instruction holistically. The ability to forecast student performance is influenced by a variety of external factors, including dietary patterns, breakfast routines, internet usage, and other factors, in addition to the features of past performance. And based on this forecast, raising the standard of instruction. Another responsibility is creating the question papers, which is a time-consuming process in a university or other institution. These days, it is unacceptable for academics to spend their valuable time designing the test. Professors can design test questions with a single click using this technology, saving them from having to ask the same questions repeatedly. The system will be able to extremely automatically process various distinct collections of papers.

V. ARCHITECTURE DESIGN

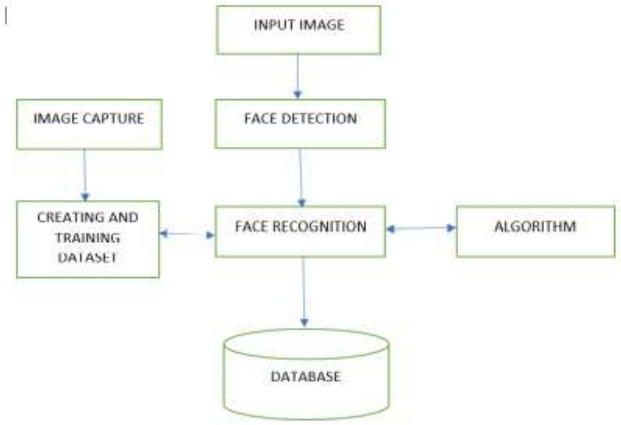
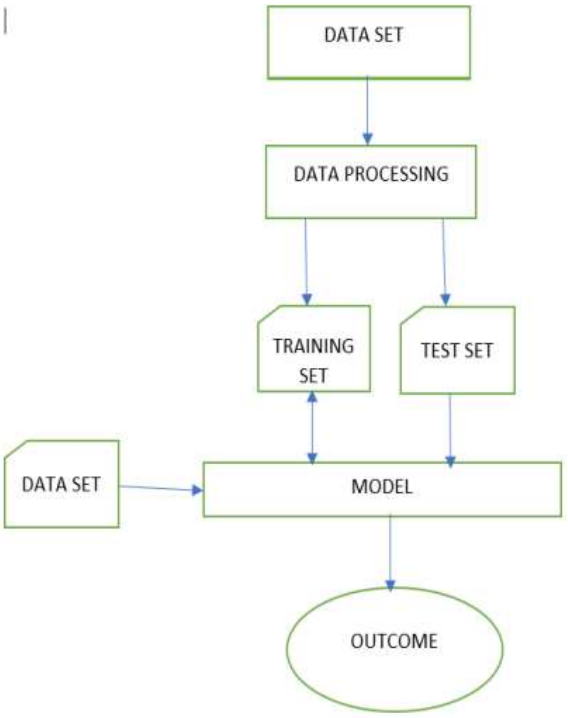


Fig 1: System Architecture



The technology not only recognises faces but also assigns questions, provides a student's current performance, and forecasts their future success. The blockchain, which employs decentralised storage and the idea of repetition, is used to store all of the data. to be used for pattern recognition and data mining. The application of GAS for pattern recognition in a learning setting is crucial. Two methods for implementing GA in pattern recognition exist: Directly use a CA as a classifier. In [used CA to locate the decision boundary in N dimensional feature space], Bandyopadhyay and Murthy. Set the parameters in other classifiers using a GA as an optimization tool. The majority of GAS applications for pattern recognition improve some classification process parameters. GAS has been employed in feature selection by many researchers. An ideal collection of feature weights that increase classification accuracy has been discovered using GAS. In order to determine the fitness function for GA [IS], the classic feature extraction technique Principal Component Analysis (PCA) is first employed, and the classifier k-NN is then used. Another area that GAS has been used to optimise is classifier combination. In their construction of a Classifier Fusion System, Kuncheva and Jain used a CA to choose both the features and the kinds of individual classifiers. The case-based classification also employs GA to choose the prototypes.

CONCLUSION

The presentation of a design and framework for taking attendance via an attendance management system makes the laborious task of taking and compiling attendance simple and effective. The prediction model's outcomes demonstrate that the suggested model has a strong capacity for adaptive learning, can learn more in-depth feature performance, and has a stronger capacity for generalisation. Compared to conventional prediction models, it has superior prediction precision and time complexity. A secure platform, random question generation, and regulated access to the resources are all improvements made by the resulting automated system for question paper development. This prototype is therefore not only less expensive, effective, low power, adapted for any other form of data collecting system, easy to use, but also lacks any difficult processes.

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