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Student Performance Analysis with Biometric Attendance

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Abstract: In today's growing world, we all know how important education have been and how important the performance have become for getting higher education or and kind of jobs. So for the calculation of performance a human take certain amount of time and yes it do consume time. So here we take certain factors like attendance, marks throughout, practical knowledge, extra skills, etc. So, we can assume time consumption for calculation of these many factors. So, here we have designed a system which would help in calculation of performance and marking attendance in a very easy and convenient method. Also, as we know marking and managing a large data of attendance is challenging as analyzing it and get the analyzed data isn't easy for human so we used NODEMCU and components to manage the attendance of student and get the analyzed data in short period of time and only mark attendance of the real student who passes the parameters such as on time and the student isn't marking proxy. It is user-friendly, secure and affordable system.

Keywords **– Data redundancy, Python language, Authentication, Prediction, Machine learning**

I. INTRODUCTION

In an education system or any work in this little world we all know that how importance the performance and consistency is so making some factors which affects performance of a student in our case is important. So some of those are attendance, exam marks, practical knowledge, extra activities, programming knowledge, teachers feedback, teachers knowledge, etc. But calculating this number of factors by humans is not feasible so does that mean we can't measure performance of a student? No, that isn't the solution for this problem.

So, here we have designed a system that is responsible for taking that load of humans. In brief our system first takes biometric input as credentials for marking attendance. Then this attendance data is stored in the database for further analysis. Also analysis related to attendance can be done using this data. And as the attendance is going to be in biometric there is no chance of proxy or fake attendance so analysis of attendance is going to be perfect and clear.

Once, we get attendance data then the other data is provided by teachers and some by students such as student provide teacher feedback, teacher provide student's marks and other academic data. And then all these data is merged and performance analysis is done.

II. LITERATURE SURVEY

After a lot of efforts for searching about this kind of system we found that a lot of people have done and given their valuable work to this world, which today we are using upgrading those according to our lifestyle. And there immense work is very useful for our work to happen. There were a lot of project using biometrics attendance or RFID as a method of attendance. A certain system used biometrics-based attendance system which did reduce a lot of efforts for marking attendance [1]. Majorly this system worked well but as we know we live in a world of hack so students even used to mark attendance even if they were not on time. Also, a system used Arduino and a single board computer with fingerprint biometrics [9].In those system the real work and efforts were made to centralize the management system. And some systems used both Arduino and raspberry Pi for attendance recording [10]. Such kind of system used Arduino and raspberry pi for marking attendance it was enough for that time. But as the time kept on moving and inventions kept happing certain researchers found that only taking attendance and not doing anything with that database was not only the role of any automated system. So, a new thing came in market known as STUDENT PERFORMANCE ANALYSIS which used student database to calculate the performance of the student. One of the researches was student performance analysis system (SPAS) [2]. It was totally web-based system which gives teacher access to trach performance of student and provide grading. Then there was introduction of a new algorithm for doing this performance work known as decision tree [3]. One can analyze the performance of a student by using certain algorithm and some data mining techniques [4]. Also, many people tried to do performance analysis with help of some hybrid machine learning algorithm [6]. But, as we all know to do any of the machine learning work the mandatory things is dataset which needs to be clear and provide some useful data so for that one used k-means algorithm[5]. And to do all this thing taking attendance a certain hardware was required which can take attendance and validate it so some people used arduino and other peripherals for the same. Using Arduino is the best thing as it is very well to be used as tool for research and study [8][7]. But while going through our project we found that using Arduino makes the system complex. So, then we decided to use NODEMCU as it had inbuilt WIFI module in it which makes the system easier to understand and much more convenient to code as we do not have to install any WIFI driver in it as it is inbuilt on it. So, we have used NODEMCU instead of Arduino in our project.

III. EXISTING SYSTEM

A vital number of research and developments have been done for making a system of performance analysis and biometric attendance. But none of those were connected with each other or provided a very user friendly interface. Also, while calculating performance teachers feedback or attendance didn't play a role. And not only this but there was no system which worried about student attendance. But as we know both of these are an important factor so we will have to take them in consideration. Also, countless number of system were made for taking attendance in easy way but some used RFID, Bluetooth, etc. But that wasn't feasible and not as secure as much biometric are, as any person carrying RFID or the Bluetooth device can mark the attendance. Also, sometimes there were cases where attendance of late comers was also marked. So, after all the research biometric was found out to be the best way for managing attendance activities.

IV. PROPOSED SYSTEM

The propound system consists of NODEMCU, LCD or OLED DISPLAY, Breadboard, R305/R307 fingerprint module, connecting wires. After connecting the system and coding and making connection to database. Teacher is required to provide biometric credentials to start the system for marking attendance. Once the system is activated then students can provide their biometric to give their attendance. After all the students are done marking the attendance teacher is required to give biometrics to stop the system and send all the data to the database. Once all of this is done you are done with the attendance procedure.

Now, for performance analysis there are two method.

1. By using database
2. By input method (i.e. providing random marks and other data to get the performance)

In this system we have proposed a method in which using previous SGPA history, we predict SGPA for the next semester.

For any of the method certain parameters are must those are sem-wise marks, attendance, feedback of teacher, current backlog(number of backlog), programming knowledge(yes or no), assignment marks, lab marks, lab attendance, extra activities, certification(in number), Internship(yes or no), projects done(in numbers) using these parameters and machine learning technique performance of student is calculated. This framework is distributed in certain modules:-

1. Administrator
2. Teacher
3. Student

V. SYSTEM ARCHITECTURE AND PIN DIAGRAM

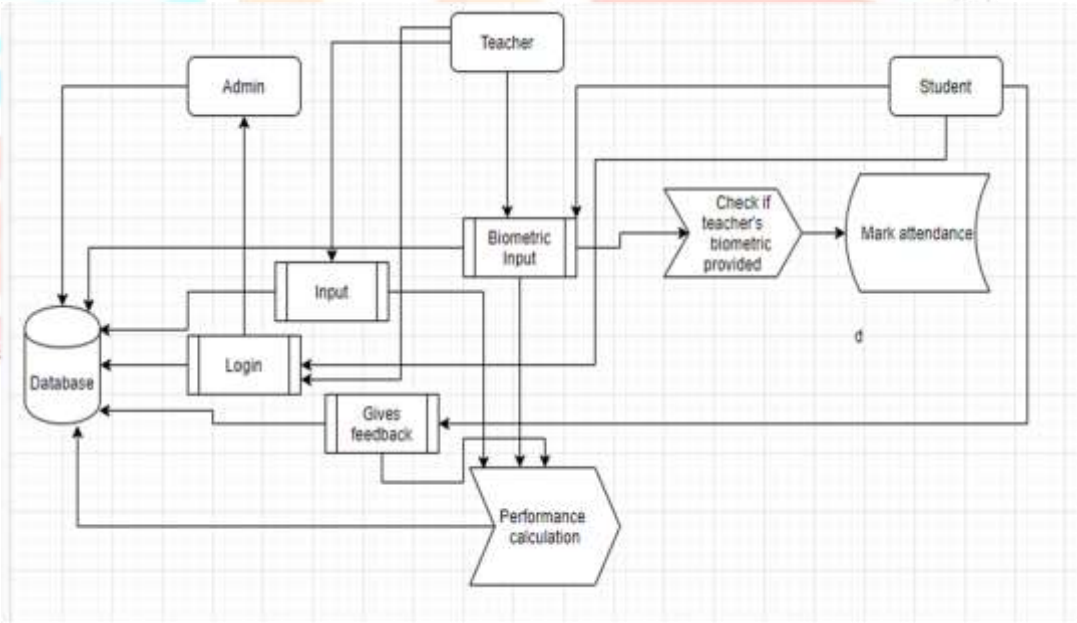

Figure 5.1: - system architecture

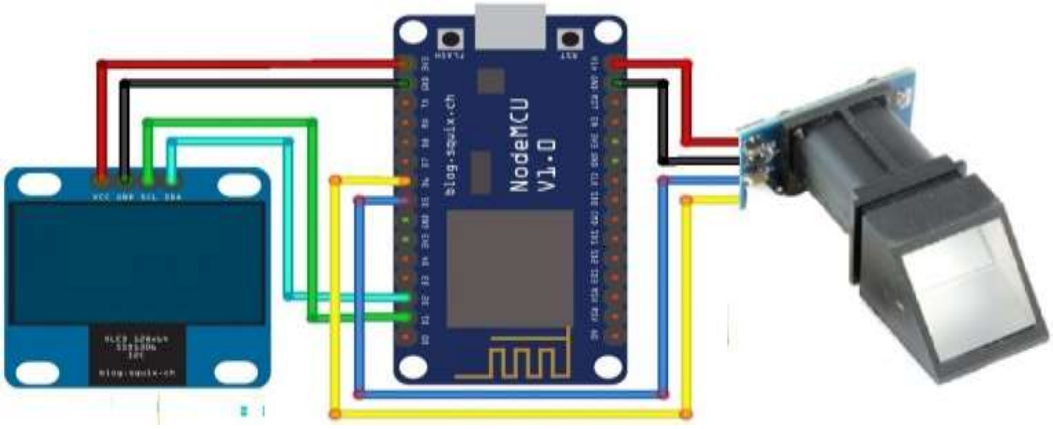

Figure 5.2: - Pin diagram

VI. ALGORITHM USED

1. Kmeans
   Used to generate target variable for the unsupervised data for data training and also it is used to generate groups in unsupervised data.
   Input: - Unsupervised data
   Output: - Target variable, Supervised data

2. Naïve Bayes
   It is used to train machine for prediction so that for every new input we get a predicted output and it gave accuracy of 91%.
   Input: - Supervised data
   Output: - Performance prediction

3. Linear Regression
   Input: - Old SGPA marks
   Predicted Output: - Next semester SGPA
   Used in marks predictor for the upcoming semester

VII. RESULT

Using this system for attendance and making use of the performance calculation algorithm we got certain output/results.

1. Performance calculation using input method

Figure 7.1:- Performance calculation using input method

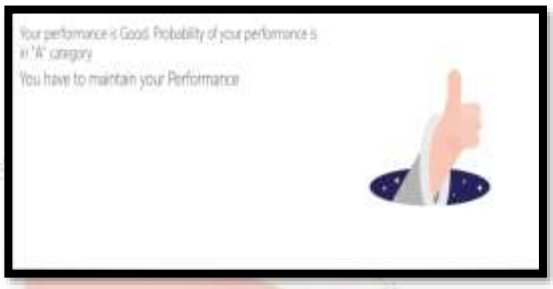

Figure 7.2:- Output for input method

2. Performance using database

Figure 7.3: - Performance using database

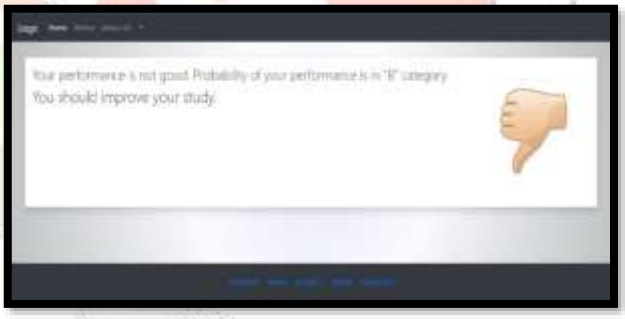

Figure 7.4: - output for database method

3. Sem-wise performance graph

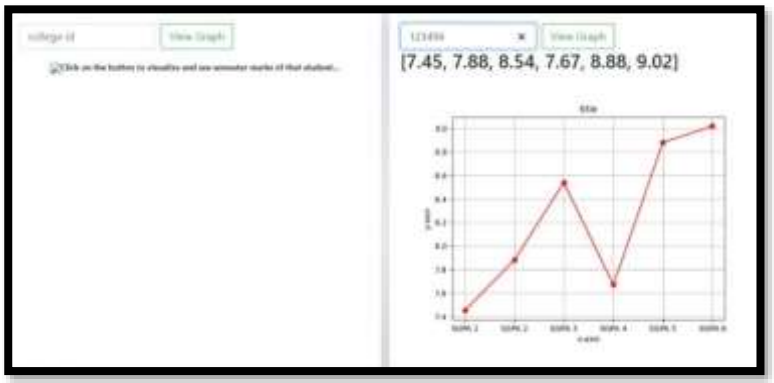

Figure 7.5: - Sem-wise performance graph

4. SGPA prediction

Figure 7.6: - SGPA prediction

Figure 7.7: - SGPA prediction output

In this project after doing all the steps we got the following result: -

1. We could predict student performance by using input method(shown in figure 7.1 and 7.2) in this method we just need to give some data input and the predicted output will be shown as performance result of the input data provided, here we don't need to worry about the data in the database.
2. We could get performance output using the database data(shown in figure 7.3 and 7.4), here we just need to select the data of whichever student the performance result is required and in a single click the output will be provided for the particular student, so here we don't need to do any kind of data entry.
3. We can see semester wise performance of each and every student as and when require in a pictorial form (shown in Figure 7.6).
4. We also have a option of predicting result based on the old performance of the student i.e. we can predict semester 7 result before the exams itself (shown in figure 7.7).

VIII. FUTURE SCOPE

We have made as much upgrades as much in a certain time a person can. But still there are a lot of future up gradation in this system which are: -

1. We can use this system to give notes to students or teachers or any kind of notices or updates can be provided using this portal.
2. There may be feedback which may ask suggestion for providing a kind of rating.
3. The dataset of performance can be used to detect where the student lags and it can be used to improve the performance of the student or even teacher when suggestion are provided.
4. Using this system in offices we can view the regular work of employee and progress of the company towards its goal.

IX. CONCLUSION

As we have made a system which is used for the betterment of teacher and student performance and reducing workload of the same. Also, it is used to make life of teachers easy by giving performance report to the institute and the attendance report as it would be automatically and easily generated using the user-friendly system as it uses real life parameters and solves the problem of time calculating performance. So certainly, in near future this system is going to be used when we all will have to run for making time for certain activities like betterment of students rather wasting time in making the attendance and performance report by hand and showing. So, this proposed framework would be used for all the schools and even companies for calculating long term goals.

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