STUDENT ATTENDANCE VISUALIZATION

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ABSTRACT

Understanding the academic performance of students in colleges is an essential topic in Education research field. Educators, program coordinators and professors are interested in understanding how students are learning specific topics, how specific topics may influence the learning of other topics, how students grades in each course may represent important indicators to measure their performance, among other tasks. The use of data visualization and analytics is expanding in education institutions to perform a variety of tasks related to data processing and gaining into data-informed insights. In this paper, we present a visual analytic tool that combines data visualization and machine learning techniques to perform some visual analysis of students' data from program courses. Two educational data collections were used to guide the creation of i) predictive models employing a variety of well known machine learning strategies, attempting to predict students' future grade based on grade and attendance previous semesters and ii) a set interactive layouts that highlight the relationship between grades and attendance, also including additional variables such as gender, parents education level, among others. We performed several experiments, also using these data collections, to evaluate the layouts ability of highlighting interesting patterns, and we obtained promising results, demonstrating that such analysis may help the education experts to understand deficiencies on course structures.

1. INTRODUCTION

The importance of analytics and predictive methods in higher education, as well as the determining factors that contribute to academic performance are discussed in many research studies in order to improve the achievement of education goals, offer new modern opportunities for improving education system effectiveness and provide learning personalization. Although the impact of learning strategies and gender differences on academic performance are addressed by Ruffing et al. (2015), the factors underlying the prediction of academic performance are still of great

interest in educational psychology. One reliable task is to ask the school for some anonymized information about previous students to obtain useful information to perform analytic tasks. In this sense, novel analysis strategies are useful in comprehending educational scenarios involving students' performance and related factors, guiding decision making by educational experts.

In this paper we present a computational system for educational data analysis. We intend to demonstrate how predictive analytics and data visualization techniques can provide powerful decision-making aids for educators and school administrators, by providing means to identify and explore trends and patterns on these data, as well as to comprehend the real situation regarding a specific education scenario. We believe that a visual analysis tool employing machine learning and information visualization techniques improves the comprehension, by educational experts, of student's behavior on subjects over the semesters, guiding them in defining effective strategies to mitigate related deficiencies.

2. LITERATURE SURVEY

"The shape of things to come: higher education global trends and emerging opportunities to 2020" in Technical Report, British Council, 2012. [1] states that This publication provides an analysis of prevailing trends that are shaping higher education globally. It also looks into the next decade to determine how these will unfold. It details the impact of demographic and economic drivers on the changing higher education landscape in the next decade. It aims to identify the most significant emerging markets for international students and the fastest growing education systems, as well as predicting which countries' systems will be most open for international collaboration in teaching and research. Classroom occupancy data,2018,[online]Available: https://smartcampus.unsw.edu.au/room occupancy/data/.[2] states that Universities worldwide are experiencing a surge in enrollments, therefore campus estate managers are seeking continuous data on attendance patterns to optimize the usage of classroom space. As a result, there is an increasing trend to measure classroom

attendance by employing various sensing technologies, among which pervasive WiFi infrastructure is seen as a low-cost method. In a dense campus environment, the number of connected WiFi users does not well estimate room occupancy since connection counts are polluted by adjoining rooms, outdoor walkways, and network load balancing. This paper develops machine learning-based models, including unsupervised clustering and a combination of classification and regression algorithms, to infer classroom occupancy from WiFi sensing infrastructure. Classroom occupancy data,2018,[online]Available: https://smartcampus.unsw.edu.au/room occupancy/data/.[3] states that Student enrollments world-wide are increasing each year, while lecture attendance continues to fall, due to diverse demands on student time and easy access to online content. The resulting underutilization of classrooms entails cost penalties, especially in campuses where real-estate is at a premium. T. Sutjarittham et al., "Data-Driven Monitoring and Optimization of Classroom Usage in a Smart Campus", Proc. IEEE IPSN, 2018.[4] states that This paper outlines our efforts to instrument a University campus with sensors to measure classroom attendance, in a cost-effective and scalable manner without endangering student privacy. We begin by undertaking a lab evaluation of several approaches to measuring class occupancy, and compare them in terms of cost, accuracy, and ease of deployment and operation. We then instrument 9 lecture halls of varying capacity across campus, collect and clean live data on occupancy spanning about 250 courses over 12 weeks during session, and draw insights into attendance patterns, including identification of canceled lectures and class tests; our occupancy data is released openly to the public. Lastly, we show how classroom allocation can be optimized based on attendance rather than enrollments, resulting in potential savings of 52% in room costs.

3. DATASET

The Student Attendance CSV File Module forms the cornerstone of our project, housing a detailed dataset that captures essential information, including student ID, date, course ID, and attendance status. Sourced from the institution's tracking system, data is meticulously collected through manual or automated entry, ensuring accuracy through preprocessing. This dataset serves as a vital tool for monitoring student engagement, identifying attendance patterns, and supporting initiatives to enhance teaching strategies and academic performance. Accessible only to authorized personnel, it provides a secure repository for attendance data, safeguarding student privacy.

4. METHODOLOGY

Existing System

The existing system is a manual entry for the students. Here the attendance will be carried out in the handwritten registers. It will be a tedious job to maintain the records for the users. This application requires correct feed on input into the respective field. suppose the wrong entered, the application resists to work.

Proposed System

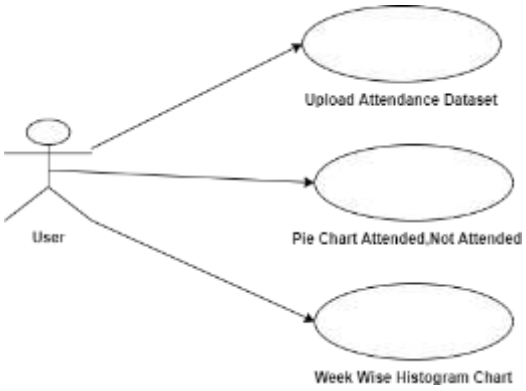
- In this project we are reading attendance data from dataset.
- Then displaying pie charts for present, absent, authorized and non- authorized absent.
- In histogram chart we are calculating students' attendance for semester week wise.

UML DIAGRAMS

UML stands for Unified Modeling Language. UML is a standardized general-purpose modelling language in the field of object-oriented software engineering. The standardis managed and was created by, the Object Management Group. The goal is for UML to become a common language for creating models of object-oriented computer software. In its current form, UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be addedto; or associated with, UML. The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artefacts of software systems, as well as for business modelling andother non-software systems. The UML represents a collection of best engineering practices that have proven successful in the modelling of large and complex systems. The UML is a very important part of developing object- oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

USE CASE DIAGRAM

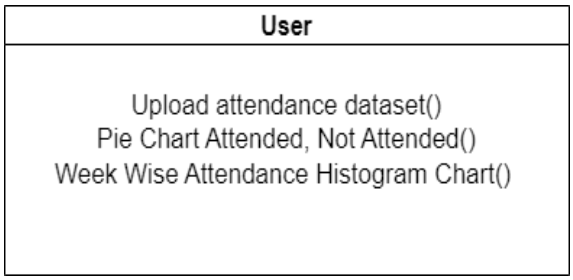
A use case diagram in the Unified Modeling Language(UML) is a type of behavioral diagram defined by andcreated from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.



USE CASE DIAGRAM

CLASS DIAGRAM

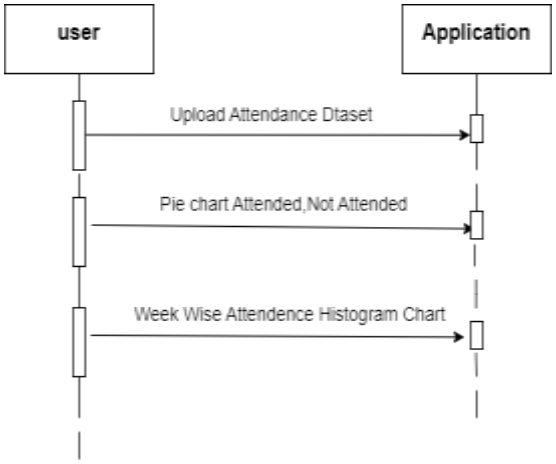
In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of staticstructure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information.



CLASS DIAGRAM

SEQUENCE DIAGRAM

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams.



SEQUENCE DIAGRAM

SYSTEM STUDY

FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placedon the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

SYSTEM TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail unacceptably. There are various types of tests.

TYPES OF TESTS

Unit testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expectedresults.

Integration testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components

Functional testing

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

System Testing

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration- oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

White Box Testing

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot “see” into it. The test provides inputs and responds to outputs without considering how the software works.

Unit Testing

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

Integration testing

Software integration testing is the incremental integration testing of two or more integratedsoftware components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that

components or software applications, e.g., components in a software system or – one step up – software applications at the company level – interact without error.

Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participationby the end user. It also ensures that the system meets the functional requirements.

5. ACKNOWLEDGEMENT

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6. CONCLUSION AND FUTURE SCOPE
CONCLUSION

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We developed a web-based visual analytics system that includes several visualization approaches to analyze academic data. Our initial results are reasonable enough to make sense out of this type of multivariate data that helped us to gain insight for better future decision making in the academic environment. We were able to show the relationships between grades and attendance, grades and genders, grades and parents' educational level and students populations and genders. Additionally, we implemented a variety of machine learning models that predict the performance of students based on their attendance (absence rate), and we employed a visualization technique to check the accuracy of different models.

FUTURE SCOPE

Visualizing student attendance can be a great way to track and analyze patterns. It could help teachers and administrators identify trends and find ways to improve attendance. There are various tools and technologies available for attendance visualization, like data dashboards or interactive charts. One approach is using interactive dashboards that display attendance data in a user-friendly way. These dashboards can show attendance trends over time, compare attendance rates across different classes or grades, and highlight areas that need improvement. Data analysis techniques to identify patterns and correlations in attendance data. This can help educators understand the factors that impact attendance and tailor interventions accordingly.

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