

Effective Continuous Student Assessment using Statistical Methods

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Abstract— The need of the hour is to impart knowledge to students especially those who are below average and help them gain foot in competing with confidence and vigor. Engineering courses are no cake walk however; a sense of enthusiasm can be developed in such students to partake later in the conglomeration of experts on completion of their course. For this to happen, proper assessment and evaluation of subjective content during the course must be done. A proper and effective assessment process should facilitate in timely identification of the student's weak topics in a subject during the course. In this paper, we discuss about direct assessment technique that starts with the preparation of the question paper, pertaining to the subject, topic-wise. The assessment of the student's answers shall be done and marks of the subject shall be entered topic-wise. When marks obtained for a particular topic of a subject is below a certain threshold, it acts as an alarm to notify the student of their weak topic that requires immediate attention.

Keywords- Direct Assessment, Student performance, Data Mining

I. INTRODUCTION

Every course offered at the University has assessment strategy that includes the objective of providing answers to the questions – what kind of things do we want our students to learn, what assessment tasks will be set and what methods of assessment will be used.

In order to gather evidence of student learning, assessment efforts are categorized as direct and indirect measures. These methods are used to provide adequate feedback to the program identify strengths and weaknesses. A direct method which is based on a sample of actual student work, including reports, exams, demonstrations, performances and completed works, require students to produce work so that reviewers can assess how well students meet expectations. The strength of direct measurement is that faculty members are capturing a sample of what students can do. An indirect method is based upon a report of perceived student learning.

The strength of indirect methods is that they could be helpful in interpreting the findings of direct method.

The advantage of using Information Technology for assessment are – more frequent formative and summative.

II. STATISTICAL TECHNIQUES

The average is a simple term with several meanings. The type of average to use depends on whether you are adding, multiplying, grouping or dividing work among the items in the set.

The average is the value that can replace existing item, and have the same result.

The *arithmetic mean* is the most common type of average”, i.e. average = sum/number

The *median* is “the item in the middle”. It handles outliers well and splits the data into two groups, each with the same number of items.

The *mode* is the best way to get a representative sample of what people want. It works well for exclusive voting situations.

The *geometric mean* is used in investments, growth, area and volume.

The *harmonic mean* helps us calculate average rates when several items working together.

III. CURRENT SYSTEM

An important factor that contributes to the reputation of any educational institute is its ranking at the University-level. This ranking is obtained by results of the students obtained at the various levels of examinations – internal theory examinations, external theory examinations, laboratory examinations, mini project exhibit and technical presentation skills. To help in effective preparation of the subjective content of the theory examinations at the University level, the institute conducts internal tests within a decent time period. However, in the existing system of internal tests, neither the student nor teacher is able to properly identify in time the weak topics that require attention and rigorous preparation.

Before the commencement of a semester, subject teachers prepare their course plan for their subject assigned. The course plan includes course planning at macro-level and lesson planning at micro-level. For each unit of the course, there are topics that are enlisted to be covered within some duration.

The constraints of the test imposes that fifty percent of the syllabus be included in the mid-term test one and fifty percent in the mid-term test two.

IV. LITREATURE SURVEY

[1] uses data mining process in a student’s database using K-means clustering algorithm to predict student results. [2] compares method selection and feature engineering, in terms of their ability to improve prediction results. The methods used were linear regression, decision tree and naïve Bayes classification. [3] used the algorithm that employed the machine learning technique- Neural Networks. The paper took into consideration the different attributes or “features” to determine the correlation with student performance.[4] used three algorithms – SVM, Linear Regression and MLP for predicting student performance. The measure of success is defined by how well the algorithms perform and this was measured by an error rate. [5] applies classification techniques and map reduce concept on educational data for predicting the student’s outcome and improve their results.[6] presents a comprehensive survey (2002 to 2014) towards educational data mining .

V. PROPOSED SYSTEM

Considering the case that a subject has eight units, then in the mid-term test one, four units of the eight has to be included in the syllabus. Each unit has certain number of topics.

These topics for a subject are selected as features to prepare the question paper of sixty marks, where each question is given equal weightage of fifteen marks.

When a teacher completes the assessment of the answer books he/she may enter the marks of students topic-wise (selected during question paper preparation).

The matrix of student by topic-wise marks scored can be analyzed to determine the various category of students and classify them into good, average or weak.

The output that is generated are student-wise weak topics or weak- topic-wise students list.

The input to our system is the mark sheet containing the department, semester, subject code, subject name, date of exam, type of test (CET or MST), enrolment number of students, scores of students.

The matrix is process using statistical average methods to classify the students (based on their marks) into weak, average or excellent.

Student Performance Identification Algorithm

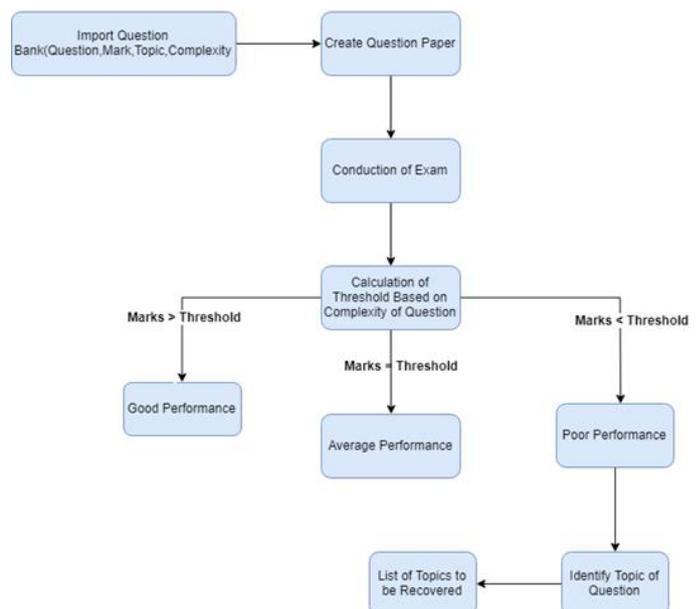


Figure 1- Activity Diagram of student classification into categories – weak, good and average

VI. ARCHITECTURE OF THE SYSTEM

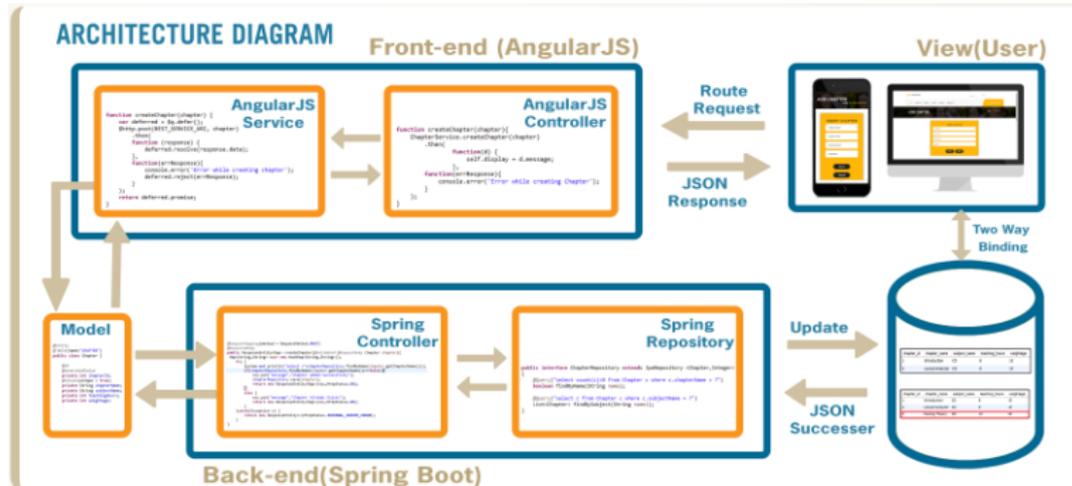


Figure 2- The architecture diagram

VII. ALGORITHM

The algorithm for our system:

1. Import the question paper from the question bank
2. Generate the question paper
3. Calculate the threshold based on complexity of question
4. If marks obtain is greater than threshold value then the performance is good.
 If marks obtain is less than threshold value then performance is poor
 Else
 Performance is average
5. In case of poor performance
 Identify the topic of question
 List the topics to be covered again

CONCLUSION

Effective assessment of the student based on the tests that the educational institutions conduct will help in better preparation of the course. Statistical techniques aid in automating this task.

This paper depicts that the best way to test the student is by asking him/her questions pertaining to the topics that are included in the syllabus provided by education board. This will help identify the topics that a student is weak and needs better preparation. The system is able to list the group of topics wherein majority of students are weak and list the group of students that are weak in particular topics.

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