Adaptive E-Learning System Using Naïve Bayes

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Abstract- *Nowadays, Data mining applications are becoming the more common tool for understanding and solving educational and administrative problems in higher education. In general, modeling student's performance manually is a difficult task for the instructor as it takes a lot of time to predict the student's performance based on the attributes collected. One of the common tools to evaluate student's performance is the course evaluation questionnaire to evaluate based on students' perception. In this study, the classification algorithm of Naïve Bayes is used to build classifier models. The performance of students is compared with a dataset composed of responses of students from a real course evaluation through Data Collection with accuracy, precision, recall, and specified performance metrics. Although all the classifier models show comparably high classification performances, Navie Bayes classifier is the best with respect to the accuracy, precision, and specificity. In addition, important variables are analyzed for each classifier model. Accordingly, it is shown that many of the questions in the course evaluation of data appear to be irrelevant. The findings of the study are to improve the effectiveness and expressiveness of data mining models in course evaluation and higher education mining. Furthermore, these findings can also be used to improve measurement instrumentsn*

Keywords- raw data, classifier model, attributes, data preprocessing, classification accuracy

I. INTRODUCTION

Recent national policies on higher education mandating high stakes evaluation of instructors and the learning system coupled with the quest for an optimal algorithm for evaluation of instructors' performance in higher institutions of learning especially in the developing countries are the primary motivation for this work. Additionally, the ever-increasing analysis on the outcome being produced by colleges and universities in recent years has not only been generating attributes about the quality and efficiency of their teaching workforce and learning systems but has continued to occupy a major place on the agenda of higher education leaders and students performance evaluation is becoming a dominant theme in the school reform efforts [1], [2], [3], [4]. With this development, there is a no doubt educational institution both in developing and developed countries have an obligation to deliver more so that university performance is often judged by the quality and reputation of the awards they provide and the product they produce [5]. According to Andrew, Bankole, and Olatunde (2010)[6], a large mismatch appears to exist between university output and labor market demand in recent times.

Their findings show that the performance of recent graduates has clearly deteriorated, primarily because of the operational policies and inadequate level of skilled human resources, especially the quality of the university-trained workforce.

II. RELATED WORK

Colleges and universities have invested time, personnel, and money into the process of students' evaluation of Students through the use of various forms of students attributes in the Collection of Data. These data provide one measure of evaluating the quality and effectiveness of the study. Despite there being positive uses of the data from student attributes, Ory and Ryan (2001) noted that there are unintended uses of the data.

This research responded to the lack of emphasis on the more effective use of the data for the purpose of improving students effectiveness by questioning the opinions and practices of the three stakeholder groups: faculty, and administrators. More importantly, this research raised the question of the value of students career ratings: Is the effort of doing student evaluations worth the institutional investment or is it simply a routine process which has little or no effect on improving students future effectiveness?

The study aims at using the classification method of Data mining for the prediction of students performance. The prediction model was developed using the Classification methods of the Data mining technique. The Naïve Bayes Algorithm is used and their performances were compared to each other.

III. DATA AND FEATURES USED

There exist a number of different software features that allows the performance evaluation of students. In our approach, we make use of the following described relevant features.

Data Acquisition: The raw data used in this study was collected from an Academic Department of a University in Ondo State, South West Nigeria. The data included two basic categories of variables, the first group consists of 350 records of the student's data variables as shown in table 1. The second group of variables includes the students' learning outcome (results) from 2010 to 2015 academics sessions.

Preprocessing data and feature extraction: The data preprocessing was carefully done to avoid incomplete records. The fields selected for the model include Appointment status, Rank, University working experience, Highest Qualification, Year of the last Qualification, Professional Qualification and Result. The instrument and variable selected for this work were based on pedagogical surveys, facts from literature and experts in the domain. The reliability and validity of the instruments used construe with the theories posited by the experts on survey design and guidelines for survey design.

IV. ALGORITHM

Naïve Bayes:

1. Let, N is the Number of parameters
2. Let, M[N] is Matrix of N
3. Let, P[N]is the Probability of N
4. Let, c be a classes
5. Let, Pi is Individual Probability
6. Let, Cn is the Number of classes
7. Let, Pn is Number of probability
8. Initialize an array M[N] for N no. of parameters
   Where N is a real number and $1 < N < 20$
9. Let, P[N] be an array of possible values in M[N]
   $P[N] = \{1; 2; 3; ....\};$
10. Calculate individual probability Pi for all classes
    Hence, $Pi = P(Cn);$
    Where $1 < i < Cn$
11. Calculate group probability for all combinations
    Hence, $Pn = P(n \mid n + c)$
    where, n and c are no .of classes
12. Calculate prediction from individual and group
    Hence, $P(Ci \mid Pn) > P(Cj \mid Pn)$
13. Calculate maximum probability from the prediction
    Hence,
    $P(Ci > Pn) = P(N \mid Ci) P(Cj) \mid P(N)$
    $Pmax < P(Ci \mid Pn)$
    $Pmax = P(Ci \mid Pn)$

V. RESULT

By using the above algorithm, we can predict the student's performance by continuously classifying the attributes. Naive Bayes classifier is the best with respect to accuracy, precision, and specificity. The result of naïve Bayes classifier is more accurate than C5.0 classifiers and other classifiers.

The following pie chart shows the result of the prediction done based on using classifier.

VI. CONCLUSION

This paper describes the performances of classification algorithms used in building a model does not necessarily indicate that the one that used the least time is the best model to use. Some Algorithms can take the least time but may not produce the best result in term of accuracy. This proposed system we are using classification algorithms and data mining techniques such as Naïve Bayes classifier as well as data from other universities. The data set is also expanded with more distinctive attributes (such as subject mastery) to get improve upon the classification accuracy and make the work more robust.

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