EVALUATING THE QUALITY OF MCA COURSE BY MINING STUDENTS' FEEDBACK – CONCEPTUAL APPROACH

Chellammal Surianarayanan
Department of Computer Science
Government Arts and Science College
Affiliated to Bharathidasan University
Navalurkuttapattu, Srirangam Tk., Tiruchirappalli
Tamilnadu, India
Email : drschellammal@gmail.com

Abstract

In education domain, course evaluation is an important topic of research. Fundamentally, the quality of any course depends on the contribution of different stakeholders in the design and development of the course. In addition, teaching & learning methodologies, the impact of the course on improving the employability skills are also playing vital role. Typically, the any course is evaluated in two different ways, one as formative assessment which is performed during the design and development of course whereas the other is summative assessment which is done typically at the end of course by collecting feedback from different stakeholders.

In this paper, a conceptual approach is presented to assess the quality of the course, Master of Computer Applications(MCA) by analyzing the feedback data using machine learning techniques.

*Keywords:*students' feedback data, course evaluation, machine learning algorithms

1. INTRODUCTION

Evaluating the quality of MCA course is an important aspect to be considered in higher education as Universities and institutes across the country are witnessing dwindling interest in the course. In 2009, there were only 29 takers for the 39 seats offered by New Delhi-based Jawaharlal Nehru University, whose MCA course is considered among the best in the country. The similar trend is being replicated in colleges across Maharashtra. In Bhubaneswar, 2,000 seats had fallen vacant in MCA in 11 MCA colleges. Thestudent enrollment of MCA in this year has reached an all time low in many colleges in Tamilnadu.If this goes this way, many colleges are in a position to close the programme. One of the main reasons for poor enrollment is that many students graduating out of many colleges either remain as unemployed. Only negligible percentage of students at MCA level is employable. Several factors driven by both educational institutes and software industries may affect employment issue.

Human resource acquisition of software industries such as Wipro have reported that though the MCA students are good at programming skills they lack in technical or know-how details. Also, the software companies are involved in 'high-end' outsourcing and the companies prefer to hire people with engineering background. Evaluating the quality of

MCA becomes crucial in order to provide MCA to students with both good academic performance and employability skills.Evaluating the quality of course based on feedback datais a common technique in higher education domain. In this work it is proposed to evaluate the quality of MCA course based on feedback data provided by different stakeholders, namely, students, teachers, placement officers, members of board of syllabus and experts from software industries.

2. OBJECTIVES

The proposed work aims to evaluate the quality of MCA in terms of course objectives, course content, course design, curriculum design, pros and cons of the course. The outcome will provide suggestions to improve the course with scope of good employability. It is proposed to collect and analyze feedback in order to suggest improvements on the following aspects.

- course design
- course content
- student hardware knowledge
- students' programming skills
- students' technical skills
- students' soft skills
- students' communicative/employability skills
- students' numerical ability /logical reasoning
- placement opportunities for students

The stakeholders include students just passed out, final students, teaching faculty, placement officers, members of board of studies, college principals and industry experts.

3. RELATED WORK

There are some research works that have theme similar to that of the proposed work. In [1], the authors provided a text mining based method to assess the suggestions collected from students' qualitative feedback. Naïve Bayes algorithms is used to analyze the sentiments from students' feedback in [2].
In [3], the authors found that Multinominal Naïve Bayes(MNB) and Multi Layer Perceptron(MLP) algorithms are very effective in extracting information from the student's feedback data when compared with other algorithms namely Support Vector Machine, Random Forest and Stochastic Gradient Decent. In another work[4], the authors analyzed the sentiments associated with students feedback data using Random Forest classifier. In another work [5], the performance of different machine learning algorithms namely random forest, multinominal Naïve Bayes and Support Vector Machine algorithms are compared in analyzing the sentiments associated with textual feedback data of students and the authors found that the multinominal Naïve Bayes algorithm

3. METHODOLOGY

The block diagram of the proposed work is shown in Fig. 1.As in Fig. 1, at first, it is proposed to state the objectives based on which the quality of the course is going to be evaluated. The objectives will be finalized by conducting an awareness programme among stakeholders. Secondly a suitable feedback strategy which helps in evaluating the quality of MCA is to be designed. It is proposed to design appropriate questionnaire for different stakeholders. For example, among the stakeholders, learners' feedback is the most important and they are the critical stakeholders. Questionnaire for learners should cover (i) questions in general about the course, like, why did you choose the course, rating the overall experience with the course, whether the course developed you professionally, (ii) whether the course met your expectations (iii) whether you agree with the course design (iv) whether the course is useful in getting you a job (v) whether the course is useful in improving you employability skills (vi) whether the course improves your interpersonal skills etc.

After designing feedback strategy, it is planned to collect data from stakeholders in different colleges/universities/institutes. The collected data will be analyzed using data mining techniques. Based on analysis, report specifying the results of evaluations will be generated along with suggestions.
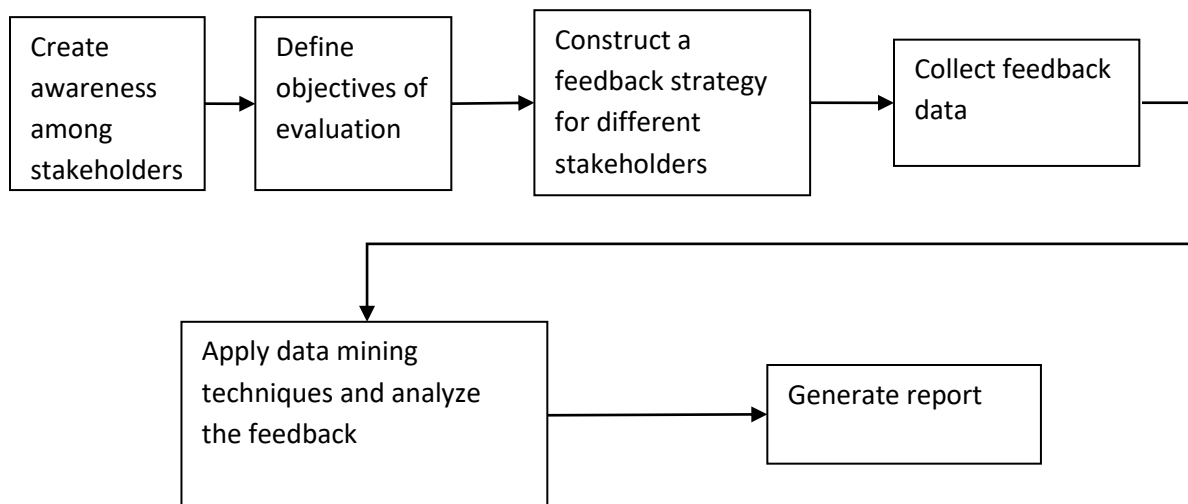

Fig. 1 Block diagram of the proposed work

4. STEPS INVOLVED IN THE FEEDBACK

The feedback forms can be analyzed using machine learning algorithms such as Random Forest, Support Vector Machine, etc. In general, the responses of the feedback form are of two types. (i) quantitative score where numerical values are involved (ii) text-based comments. The text-based comments are at first removed for stop words.

The texts are tagged with different Parts Of Speech(POS) such as nouns, verbs, etc. Then features are extracted from the preprocessed contents. The extracted features are given to classification algorithm to analyze the positive and negative feedback associated with the data. The typical work flow in the analysis of feedback will be as shown in Fig. 2.
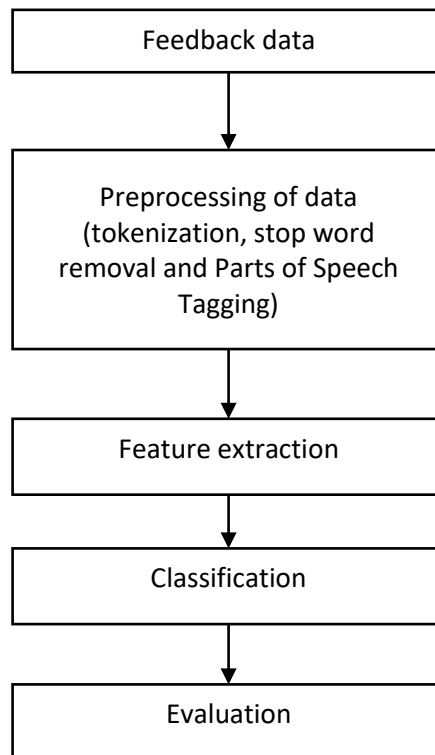

Fig. 2 Steps involved in the analysis of feedback

5. PERFORMANCE ANALYSIS

The performance of the model will be determined using confusion matrix. Confusion matrix is represented using four measures, namely, True Positive (TP), False Positive (FP), False Negative (FN) and True Negative (TN) which are defined as follows.
True Positive (TP) represents that the actual value as true and predicted value as true.

- False Positive (FP) denotes that the actual value as false and predicted value as true.
- False Negative (FN) represents that the actual value as true and predicted value as false.

- True Negative (TN) represents that the actual value as false and predicted value as false.

A sample confusion matrix looks like as given in Fig. 3.

Further, the mathematical formulae for different evaluation measures, namely, accuracy, precision, recall and F-score are given through the following equations

(i) Accuracy

Accuracy is calculated as the number of all correct predictions divided by the total number of the sample. Accuracy can be calculated with the following formula,

$$Accuracy = \frac{TP + TN}{TP + TN + FN + FP}$$

Actual values

	Positive (1)	Negative (0)
Positive (1)	**TP**	**FP**
Negative (0)	**FN**	**TN**

Predicted values

Fig. 3 Confusion matrix

(ii) Precision

Precision is calculated as the number of correct positive predictions divided by the total number of positive predictions. The formula for calculating prediction is given below:

$$Precision = \frac{TP}{TP + FP}$$

(iii) Recall

Recall is calculated as the number of correct positive predictions divided by the total number of positives. Recall can be calculated as,

$$Recall = \frac{TP}{TP + FN}$$

(iv) F – score

F – score is a harmonic mean which helps to measure recall and precision at the same time. It can be calculated as,

$$\text{F-score} = 2 \times \frac{\text{Recall} \times \text{Precision}}{\text{Recall} + \text{Precision}}$$

6. CONCLUSION

Evaluation of any course in education domain is very important topic of research. This evaluation is typically done using feedback collected from different stakeholders. More important aspect of the feedback is the nature of data is text and it is unstructured type. Natural Language Processing(NLP) and machine learning techniques are very useful in analyzing such feedback data. In this paper, a conceptual model is proposed to evaluate the feedback of stakeholders towards improving the quality of Master of Computer Applications.

References

[1] Gottipati, S., Shankararaman, V. & Lin, J.R. Text analytics approach to extract course improvement suggestions from students' feedback. RPTEL 13, 6 (2018). https://doi.org/10.1186/s41039-018-0073-0

[2] Altrabsheh, N, Cocea, M, Fallahkhair, S (2014). Learning Sentiment from Students' Feedback for Real-Time Interventions in Classrooms. In: Bouchachia A. (eds) Adaptive and Intelligent Systems. Lecture Notes in Computer Science, vol 8779. Cham: Springer.

[3] Irfan Ali Kandhro, Muhammad Ameen Chhajro, Kamlesh Kumar, Haque Nawaz Lashari and Ushman Khan, "Student feedback sentiment analysis model using various machine learning schemes : A review", Indian Journal of Science and Technology, Vol 12(14), April 2019

[4] Kousalya, Subhashini, "Sentiment analysis for students' feedback using machine learning approach", International Research Journal of Engineering and Technology, vol. 6, Issue 4, Apr 2019

[5] Dsouza, D. D., Deepika, Nayak, D. P., Machado, E. J., &Adesh, N. D. (2019). Sentimental analysis of student feedback using machine learning techniques. International Journal of Recent Technology and Engineering, 8(1 Special Issue 4), 986-991