



# Electronic Student Counseling System Using Data Mining Techniques

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**Abstract:** Electronic counselling system improves the performance of the students based on their reasoning. The problems faced by the students due to different kinds of interactions in their life where resulted in the unpleasant academic performance that can be solved by this system by using the application of a combination of machine learning and natural language processing technology on student feedback data gathered from them. The feedback system collects student's responses and guidelines positive or negative or neutral opinion about their course by performing data mining techniques. The Weka software is used for applying the methods on the student's data set. The widely used algorithm in data mining i.e., apriori algorithm is specifically considered for the extraction of the knowledge. The Weka tool software is used for applying the methods on the graduate student's data set. The system is designed to justify that various data mining techniques which includes classification, can be used in the collected datasets to improve student's performance, and to overcome the problem of low grades of student's.

**Keywords:** Data mining, Student Performance, Counselling, Association rule.

## I. INTRODUCTION

Data Mining, the extraction of hidden predictive information from large databases to help companies and educational institutions focus on the most important information in their data warehouses. Data mining tools predict future trends and behaviours. Although using data mining in higher education is a recent field, there are many works in this area. That is because of its potentials to educational institutions. The student's data were collected as a dataset from the Departments of an institution. To predict the attributes such as behaviour, attitude, interaction and academic performance, the similar set of data were predicted. The system is designed to justify that various data mining techniques which includes classification, can be used in the collected datasets to improve student's performance, and to overcome the problem of low grades of student's. From The discovered knowledge, we provide a college management with a helpful and constructive recommendation to overcome the problem of low grades of students, and to improve student's academic performance. There are many kinds of knowledge can be discovered from the data. In this work we investigate the most common ones which are associated rules. The Weka software is used for applying the methods on the student's data set. The widely

used algorithm in data mining i.e., apriori algorithm is specifically considered for the extraction of the knowledge. The Weka tool software is used for applying the methods on the graduate student's data set

## II. RELATED WORKS

Based on tweets sent in twitter the problems faced by the student during Engineering studies is analyzed using multilabel classification algorithm[2]. Discrimination of online messages between depression and control communities using mood, psycholinguistic processes and content topics extracted from the posts generated by members of these communities[1]. Students performance examined using mixed methods and for assessing students progression in their conceptual understanding in science, a yearly comparison to be made. Data analysis done on mobile learning artifacts, activity performance in classroom and test results[11]. Students could automatically open their own debates for their teamwork, debate evaluation would be moved to global marks in an easy way and teachers could automatically create class groups. This tool is used in teaching field. The one more application is opinion polls useful for advertising social research, Journalism, politics and decision making. The other applications involves sport



clubs, neighbor meetings and labour unions which are having a human group consisting of a high level of members[4].The students' performance is improved based on the prediction of good behavior, good relationship and average attitude with faculty members and tutors by using Behavior Attitude Relationship Clustering algorithm[7].Based on historical information from the database,an analysis and prediction of students placements is done by considering the students information at different confident levels and support counts to generate association rules[9].To improve student performance by increasing grades of the students. Educational data mining techniques are used[6].The interaction pattern that helped to promote silent collaboration over verbal interactions when studying literature and grammar, showing it is possible to make large groups of students collaborate in an orderly fashion and where everyone has to participate. This pattern is implemented in an application for Interpersonal computer with a shared display in which collaborative activities can be represented in a matrix or as a cloze exercise[5].

### III. EXISTING APPROACH

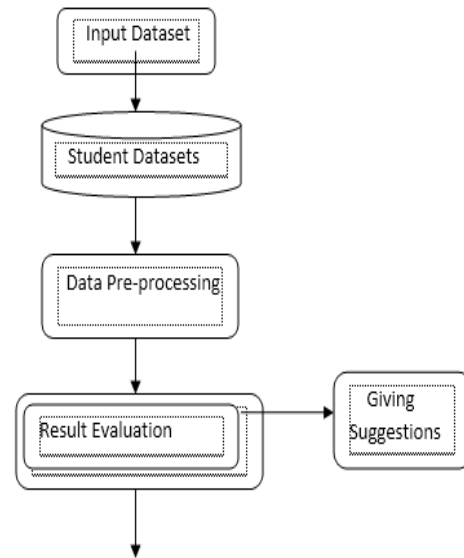
Existing system have developed a model only for the placement database so that institutions can use it to discover some interesting patterns that could be analysed to plan their future activities. The issues regarding the outcome of the research is that, it depends on the completeness and the accuracy of the data being analysed and it requires a domain expert to evaluate the generated rules.The existing approach of "student counseling" works manually or computerized in a building. Therefore, all types of works are maintained in a building .so maintaining all the counseling forms are very difficult. If we are reporting, then we need to go to the counselor and get a form for reporting and fill the form and submit to the counselor. Then verify their forms by counselor and maintain the records in the computer or register.

### IV. PROPOSED APPROACH

The system is mainly related to online counseling system, which is developing an online web based application system. In proposed system at first reduce the problem, which is faced in existing system. So in the proposed system, "student electronic counseling system" will provide the online facility for reporting the student academic performances. In the proposed system, we provide a college

management with a helpful and constructive recommendation to overcome the problem of low grades of graduate students, and to improve students' academic performance by electronic counselling system.

### V. SYSTEM ARCHITECTURE



**Fig 1. System architecture for student counseling system**

The systems are

1. Data collection
2. Pre-processing
3. Association
4. Suggestions

#### 5.1 DATA COLLECTION

The students' data were collected as a dataset from the students. To predict the attributes such as behaviour, attitude, academic results and student staff relationship interaction, the similar set of data were predicted and classified.

#### 5.2 PRE-PROCESSING

As part of the data preparation and pre-processing of the data set and to get better input data for data mining techniques, pre-processing done for the collected data before loading the data set to the data mining software, irrelevant attributes should be removed. The attributes are processed via the Weka software to apply the data mining methods on them.



### 5.3 ASSOCIATION RULES

Mining association rules searches for interesting relationships among items in a given data set. It allows finding rules of the form if antecedents then (likely) consequent where antecedent and consequent are itemsets. Itemset is set of one or more items. As part of association method, Apriori algorithm is applied to the data set.

### 5.4 SUGGESTIONS

Using Eclipse suggestions are given to the students based on their academic performance.

- ❖ Writing activities by the professional & academic institution on a convenient space

Easy & efficient means for providing counseling based on the performance evaluation of the students.

| Student ID | Gender | Course | Department | Year | Is course c | Any English | Medium o | Mode       | Mode of T | Academic GPA (%) | Habit of st | Hours spe | Individual | Group stu | Del |
|------------|--------|--------|------------|------|-------------|-------------|----------|------------|-----------|------------------|-------------|-----------|------------|-----------|-----|
| 1          | Female | B.E.   | Computer   | 2 nd | Yes         | No          | English  | Day School | Train     | 3-3              | Ansars      |           |            |           |     |
| 2          | Female | B.E.   | Computer   | 2 nd | No          | No          | English  | Day School | Others    | All Clear        | 6.52        | No        | 2 hours    | Yes       | No  |
| 3          | Male   | B.E.   | Computer   | 2 nd | No          | No          | English  | Day School | Others    | 3-3              | Ansars      |           |            |           |     |
| 4          | Male   | B.E.   | Computer   | 2 nd | No          | Yes         | English  | Day School | College   | Bu               | All Clear   | 7.65      | No         | 1 hour    | Yes |
| 5          | Male   | B.E.   | Computer   | 2 nd | No          | Yes         | English  | Day School | College   | Bu               | 4-7         | Ansars    |            |           |     |
| 6          | Male   | B.E.   | Computer   | 2 nd | No          | Yes         | English  | Day School | Train     | All Clear        | 7.3         | Yes       | 4 hours    | Yes       | No  |
| 7          | Female | B.E.   | Computer   | 2 nd | Yes         | No          | English  | Day School | Train     | All Clear        | 7.3         | Yes       | 4 hours    | Yes       | No  |
| 8          | Male   | B.E.   | Computer   | 2 nd | No          | Yes         | English  | Day School | Train     | 3-3              | Ansars      |           |            |           |     |
| 9          | Female | B.E.   | Computer   | 2 nd | Yes         | Yes         | English  | Day School | College   | Bu               | All Clear   | 7         | No         | 1 hour    | Yes |
| 10         | Male   | B.E.   | Computer   | 2 nd | Yes         | Yes         | English  | Hosteller  | Others    | All Clear        | 6.5         | No        | 4 hours    | Yes       | No  |
| 11         | Female | B.E.   | Computer   | 2 nd | Yes         | Yes         | English  | Day School | Train     | 3-3              | Ansars      |           |            |           |     |
| 12         | Female | B.E.   | Computer   | 3 rd | No          | No          | English  | Hosteller  | Others    | All Clear        | 7.2         | Yes       | 2 hours    | Yes       | Yes |
| 13         | Female | B.E.   | Computer   | 3 rd | No          | Yes         | English  | Day School | Train     | All Clear        | 7.52        | No        | 2 hours    | Yes       | Yes |
| 14         | Female | B.E.   | Computer   | 3 rd | Yes         | No          | English  | Day School | Others    | All Clear        | 8.08        | No        | 1 hour     | Yes       | Yes |
| 15         | Female | B.E.   | Computer   | 3 rd | No          | No          | English  | Hosteller  | Others    | 3-3              | Ansars      |           |            |           |     |
| 16         | Female | B.E.   | Computer   | 3 rd | No          | Yes         | English  | Day School | College   | Bu               | 3-3         | Ansars    |            |           |     |
| 17         | Female | B.E.   | Computer   | 3 rd | No          | Yes         | English  | Day School | Others    | All Clear        | 7.4         | Yes       | 2 hours    | Yes       | Yes |

Fig 2. Dataset collected from engineering college students

## VI. RESULTS AND DISCUSSIONS

Electronic counseling possesses numerous features to improve the academic performance of students. Based on the features regarding collected in Google forms. Based on the features of the students, Association rule is applied. The features of counseling system are briefed as follows,

- ❖ Cost Effective software product
- ❖ Reliable tool on the go, convenient access from any device with internet connectivity & web browser
- ❖ Self-Assessment via peer review & feedback facility
- ❖ Manual evaluation can be replaced by this system.
- ❖ The proposed system will save significant amount of time and effort invested by the university.
- ❖ The system fully works as an online.
- ❖ Centralized maintainance of all information.
- ❖ It helps the counselor to dynamically add records to the database.
- ❖ Easy to manage whole counselling procedure.
- ❖ Effective source for carrying out project documentation, assignment based on academic & general topics and other

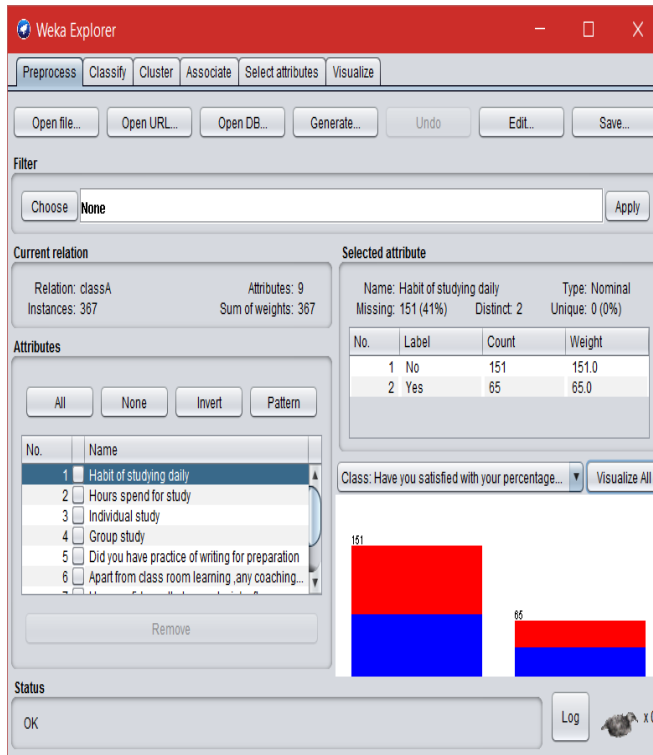


Fig 3. Attributes collected from students

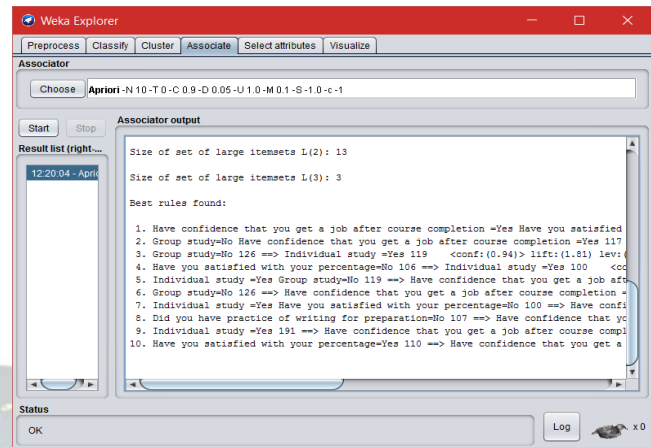


Fig 4. Frequent itemset generation using apriori algorithm

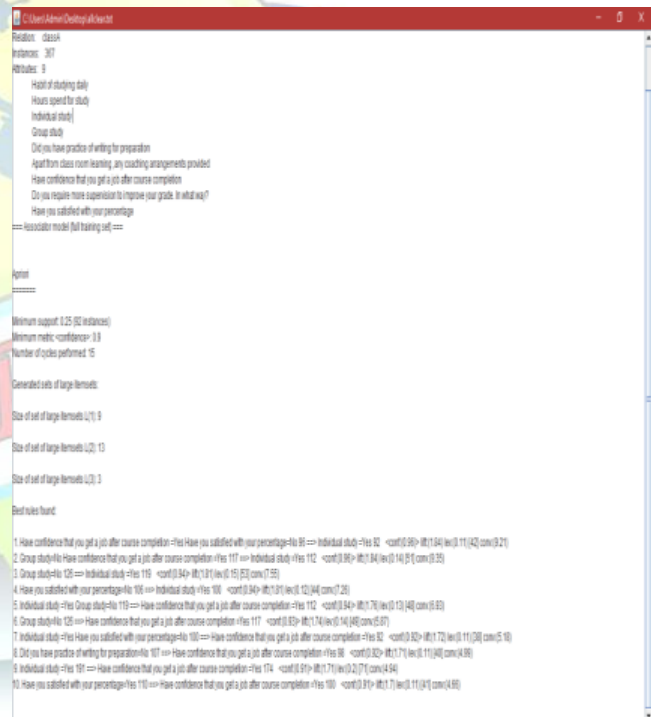
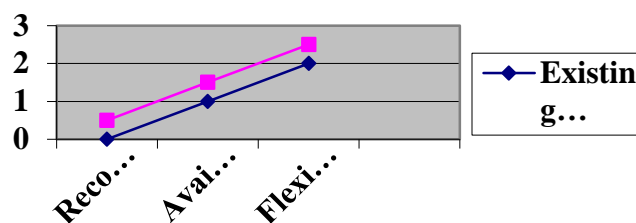


Fig 5. Rule Generation





**Fig 6. Performance Evaluation**

Whole work is about counselling the students based on their performance. In this paper, we have explained the system we have used to predict the performance of students, based on the previous academic results and behaviour of the students.

## VII. CONCLUSION

This system used to predict the performance of students, based on the previous academic results and behaviour of the students. Data mining applications play a vital role in extracting unknown knowledge from vast data sets. In this paper we have developed a model for the student database so that institutions can use it to discover academic performance that could be analysed to plan their future academic results.

### 7.1 FUTURE ENHANCEMENT

The future scope could be dynamic updating of the database by the user before applying the algorithm to generate the patterns of interest rather than performing it on statistical historical data. Moreover, the data mining can be made as constraint-based mining wherein the rules can be generated based on the constraints provided by the user.

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