

TEACHER RANKING SYSTEM TO RANK OF TEACHER AS PER SPECIFIC DOMAIN

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Abstract

Today, data mining is used in every area. In data mining, huge quantity of data can be store. Now education is very powerful field. In this field, data mining suggests many techniques, tools and research plan for extracting large data generated by learning activities in educational system. The main aim of paper, we create a system which is giving rank to teacher as per subject or domain. It will help to assign teaching load to the teacher and assign subject to the teacher. This paper introduces a system i.e. system decide which teacher teaching which subject on the base of rank. The system assigned the subject is based on various parameters such as how many time teachers teach those subjects, resume, work done on subject, area of interest, student feedback ,etc. When principle or HOD assign proper teaching load to the faculty, the expertise of that faculty should be consider. Teaching load distribution is complicated work as it as many constituents such as maximum teaching load as each faculty, number of working hours etc. So, this system is useful to manage load of department. Therefore, there is need of recommendation system which will helpful to HOD as department level and principle as institute level.

Keywords:

Clustering, Naïve Bayes, Decision Trees, Weka

1. INTRODUCTION

In today scenario, educational field is very important for developing our country. In education field, various techniques and methods is used for developed this system. Data mining field is vast and store large information or data. Data mining also handle structured or unstructured data. Data mining is playing an important role in education system. So, we create a new system which reduces the load of department. This system is handling by head of department (HOD). We design such type of system which is give rank to teacher as per subject or domain. The main question is that why we need to create such type of system?

The work load of department is always more. This load is handled only by head of department. Subject assigning is the difficult job. So many things have considered during assigning the particular subject to the teacher or faculty member of department. The head of department (HOD) is doing this work i.e. assigning subject to the teacher according to their qualification, teaching experience, how many time teacher teach those subject, student feedback, etc. The HOD considers this attribute for assign subject.

So, we proposed the system which is used to give ranking to teacher as per specific domain or subject. This system will help to assign teaching load to the teacher and assign subject to the teacher. In this paper, system decide which teacher teach which subject or domain based on various parameter such as how many time teacher teaches those subject, resume, student feedback, etc. In teacher resume all parameters are present like qualification, industrial experience, teaching experience, technical skill, area of

interest, projects, paper publication etc. When head of Department (HOD) assign proper teaching load to the faculty members, the expertise skill of that group of departments should be consider. The teaching load distribution is hectic job of HOD. The question is arriving that, why assigning the subject is hectic job of head of department (HOD)?

If the head of department are assign subject to those teacher that have very less knowledge of that subject. Then student is taken poor grade on that subject. The problem is face by student and effects on student results. If the head of department are assign subject to that teacher that has a lot of knowledge of that subject. Then the student is achieving good grades. Therefore, the academic result of colleges or institute is outstanding. So that, we are design such type of new system. These applications are reducing the weight of department and also help to the head of department (HOD) as department level and principle as institute level.

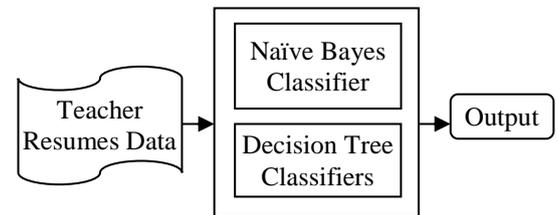


Fig.1. Overall System

In the above diagram, shows that overall system process. In this figure, the teachers resume is uploading in that system and then using Naïve Bayes or decision tree algorithm. Then give the final results. The results mean that allocate a subject according to their criteria. The flow of system, the head of department (HOD) is allocating a subject in teachers according to their resumes.

The rest of paper is organized as follows: Section 3 reviews the related work on teacher performance. In section 4 we introduce the proposed system architecture in detail. Conclusions are drawn in section 5.

2. LITERATURE REVIEW

Hemaid and Halees [1] proposed that improve the teacher performance. In this paper, design a model that calculate the performance of teacher using though data mining techniques like association and classification rule (K-NN, Decision trees, Naïve Bayes) and find the better performance and improve the educational process. Asanbe et al. [2], proposed that increase the highest quality of education. This study also improves the performance of the teacher in high institute. In this paper, Weka machine learning tool is used and artificial neural network and decision trees is also used. This technique increases the

performance of teacher. Nirmala et al. [4] examined that the number of attributes perform prediction need for the faculty member valuation. The main aim of the paper is that to predict the quality and productivity of faculty members and staffs. Tamije et al. [5] improved the quality of education process using different data mining applications. The proposed methods give precision, recall and reduced the error rate in classification. Archana and Elangovan [6] studied classification methods like K-NN, Naïve Bayes, SVM, etc. This paper also provides advantages and disadvantages of different classification methods. Singh and Hasan [7] studied various classifications in sight of text classification, phrase and classifier. Korde et al. [8] improved the text classification and found the time complexity performance. Chourasia [9] proposed an advanced Recommender System to provide higher quality of recommendations by combining the Multiple Criteria rating and the Multidimensional approaches. Rokach et al. [10] studied decision trees classifiers and uses top down approach with Pruning method and slitting criteria. Haripriya and Porkodi [11] conducted a detail study of DICOM i.e. medical images. This DICOM images are very complicated. This paper evaluates data mining techniques used in DICOM images and stored in distributed storage. Harshna and Kaur [12] studied the purpose of data mining. Meenakshi and Geetika [13] compared different classification technique using Weka. The aim of paper is performed different classification methods on clinical data. Ogunde and Ajibade [15] made a new design that will predict students' graduation rank build on entrance outcomes data using the Iterative Dichotomize 3 (ID3) decision tree algorithm was succeed. ID3 decision tree algorithm was used to train the data of the graduated stands.

Pandey [16] discussed four different types of decision tree algorithms J48, NB tree, Rep tree and Simple cart were to find similarity and J48 decision tree algorithm is found to be the best appropriate algorithm for model design. The outcomes obtained in this paper is present study may be useful for recognize the weak students so that management could take suitable actions, and success rate of students could be expanding sufficiently.

Bhatt et al. [17] analyzed applicable features based on quantitative and qualitative aspects of a student's profile such as CGPA, educational behave technical and communication skills and make a model which can predict the placing of a student. For this purpose, ID3 classification technique based on decision tree has been used.

Ahmed et al. [18] proposed the classification work is useful to predict the final rank of students and as there are many more approaches that are used for data classification, the decision tree (ID3) method is used here.

Barrak and Razgan [19] used educational data mining to forecast students' ending GPA dependent on their rank in existing courses. In case study, we gather together students' copy data that included their final GPA and their rank in all pattern. After pre-processing the data, we assign the J48 decision tree algorithm to discover classification rules. We extracted useful knowledge for final GPA, and identify the most important courses in the students' study plan based on their rank in the compulsory patterns.

Kolo et al. [20], the research is on the use of a decision tree approach for predicting student's educational performance. Society makes or become better the quality of its citizens with help of education. It also makes a quality better of education field

to predict the student academic performance. The IBM Statistical Package for Social Studies (SPSS) is used to apply the Chi-Square Automatic Interaction Detection (CHAID) in provides the decision tree structure. Elements such as the financial status of the students, purpose to learn, gender were investigated to affect the performance of the students.

Pal and Pal [20], proposed that to perform an examined to think about number of factors for the derivation of performance prediction measure required for teacher's performance evaluation, observe and estimation. The main aim is to predict the standard, efficiency and possible of faculty over various controls which will permits higher level authorities to hold conclusions and believe confirmed patterns of teacher's inspiration, fulfillment, and growth reduce.

3. SYSTEM OVERVIEW

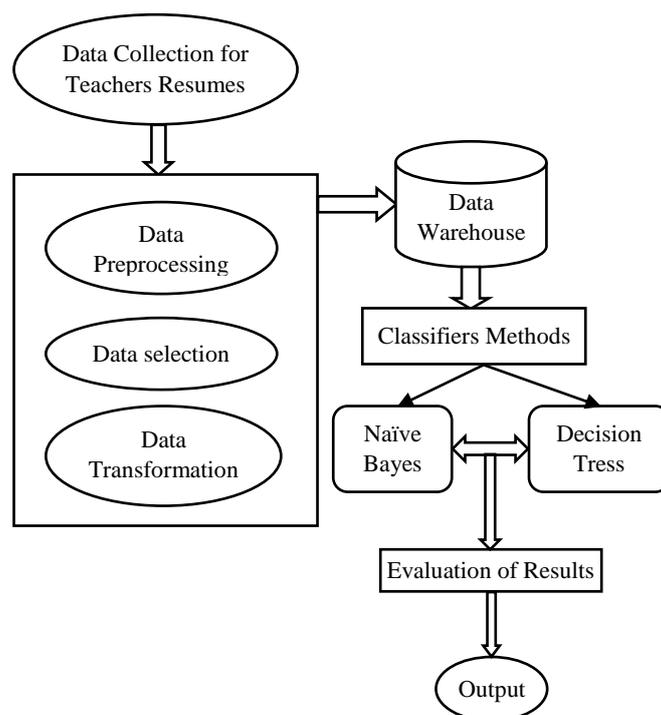


Fig.2. General Diagram of System architecture

In system architecture, first we find out the teacher's requirements and performance made. Then we design a proposed system which is useful to the head of department (HOD) as a departmental level or principle as an institute level.

3.1 DATA PREPARATIONS

For this study data were collected from the teacher's resumes. In this resume, there are four attributes like rank, experience, qualification, skill, subject mastery. First attribute rank is considered as assistant professor, associate professor, professor. The teacher is fulfilling these rank attribute criteria, then the subject is assign that teacher. Second attribute is teaching experience of teachers i.e. how many times teacher teaches same subjects. We consider professional skill is as third attribute. Professional skill means that teacher has more interest subject or domain. And last is subject mastery i.e. qualification or expertise

in domain or subject. These four-attribute extracted from word file to text file.

3.2 DATA SELECTION AND TRANSFORMATION

In this stage, we are selected four important attributes as required for projects. Rank is first attribute. The rank is based on teacher designation (Assistant Professor, Associate Professor, and Professor). Experience is based on how many time teachers teach those subjects. These attributes extracted from word to text file. Then this text file is used for further process. Professional skills and subject mastery is another two attributes are using this dataset.

3.3 IMPLEMENTATION

We are going to execute our project using decision tree algorithm and Naïve Bayes algorithm.

We create a dataset names as teacher recruitment. This dataset stored in Arff format. In that dataset, we consider two main datasets as one is data and second is relation. We are considering four attributes are as rank, experience and professional skills and subject mastery. At data store their four attributes while running the program and give the expected output or results.

This paper, we are collecting the entire teacher resume. Resume in word format and then convert into text format. We have considered 10 teacher resumes. Every resume mention qualification, teaching experience, projects, skills, area of interest etc., so that, we are creating four frameworks i.e., login frame, Admin Panel framework, Registration frame and User frame.

In login frame, admin and user both are handled. First, we register the teacher information in registration frame and fill entire details of teacher and submit. Then the information data is stored using Wamp server. All the database is save in Wamp server.

In user frame, if user is register all the basic detail in registration framework then user uploads their resume. After uploading resume, it's also show the subject is assigns the teacher or faculty members. User is receiving the message that he or she allocated this subjects.

In admin login, admin operates the whole system. In this panel, four attributes are present as faculty details, faculty portfolio view, initial stage and performance analysis. Faculty details show the basic information of teacher or faculty members likes name, branch, mobile numbers etc. In faculty portfolio, we can view teacher or faculty member's resumes and analyzed this information. In this portfolio, we are used two algorithms i.e. Naïve Bayes and decision trees. Then assign the subject or domain of teachers with prediction. The ranking show the results base on prediction values of every user. Ranking Frame displays the entire user list and their assign subjects according to user criteria. We also display the subject wise list. If we can select soft computing subject then show the teachers list based on their eligibility. Initial stage is entering the dataset only and views the train classifier. Teacher recruitment dataset is entering and train classier show the precision, recall is null.

Performance analysis shows the accuracy and time required graph using naïve Bayes and decision trees algorithm.

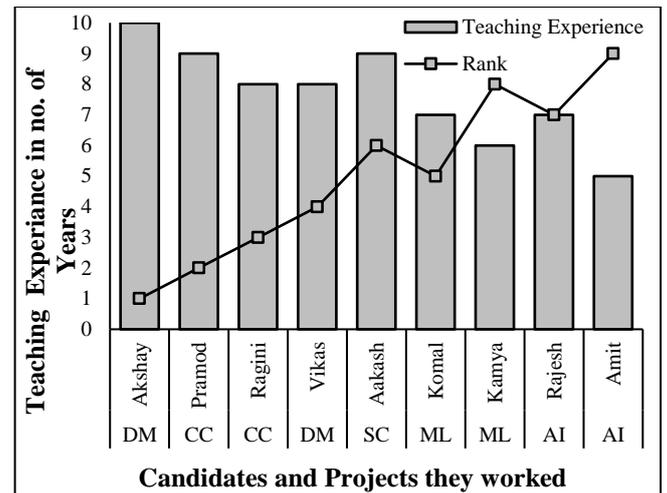


Fig.3. Ranking based on teaching experience and projects they worked

The Fig.3 show that teaching experience and projects or skills of teachers how they work. We have nine teachers or faculty members are present in that chart. The ranking is based on their experience and skills or projects.

In this chart, we assign four subjects (Data mining, Cloud computing, Soft computing, Artificial Intelligent) on which teacher having fulfill their criteria. The first plot shows the highest teaching experience and its rank is one. Vikas have eight years teaching experience and their skill on data mining. Therefore, the system decides to give Akshay should teach Data mining subject. Pramod and Ragini have same skills and projects related on cloud computing. But, their teaching experience is different. So, Pramod should teach Cloud computing subject. The Pramod rank is two and Ragini rank is three. Aakash should teach Soft computing subject. He had only one to teach soft computing subject. Komal and Kanya have same skills and projects related on Machine Learning subjects.

But, their teaching experience is different. Komal teaching experience is seven years and Kanya has six years. Hence the Komal rank is 5 and Kanya is in 8. So, the Komal should teach Machine Learning subject.

Rajesh and Amit's have same skills and projects related on Artificial Intelligent subjects. But, their experience is not same. Teaching experience of Rajesh is seven years and Amit is 5 years. Hence the Rajesh rank is 7 and Amit is in 9. So, Rajesh should teach Machine Artificial Intelligent subject. All the values of above Fig.3 are arranged in tabular format. So, it is easy for understanding the user as well as admin.

In Table.1 only visible that teaching experience. The rank is based on both attributes are teaching experience and projects they worked. If any user having 10 years teaching experience in Data Mining and he is project worked also in Data mining, then therefore the rank of that person or user is first. And admin can assign that person to teach Data mining subjects.

Table.1. Ranking Based on Teacher Experience

S. No.	Name	Teaching experience	Rank
1	Akshay	10 years	1
2	Pramod	9 years	2
3	Ragini	8years	3
4	Vikas	8 years	4
5	Aakash	9 years	6
6	Komal	7 years	5
7	Kamya	6 years	8
8	Rajesh	7 years	7
9	Amit	5 years	9

4. CONTRIBUTION

We are assembling the dataset in the form of documents file. The dataset means those teachers or faculty member's resume and student feedback also. Then word document file transform into text document file. Now resume document file transform to text file. In this resume, four attributes are present. These four attributes remove from the word file. The rank, professional skill, teaching experience and subject mastery are the four-attribute using in this project. The next stage to analyzed whole data and executed in WEKA tool i.e. Weka classifier for classification and clustering algorithm. Another stage is prediction. In prediction process, we use naïve Bayes and decision tree algorithm. Naïve Bayes produce error in prediction value that can be used to rank domain or subjects and allocate the top ranked subject to teacher. Decision trees can only give decision but cannot rank two decisions on behalf of training set passed. Hence, we are operating naïve Bayes algorithm. Naïve Bayes is also give prediction values of each resumes uploading in projects or system.

We can also collect some reviews and feedback from student about teachers' behavior or their teacher teaching skills. All related files of student feedback are stored in database. Reviews are positive or negative both are stored and using the sentiwordnet sentiment library. We consider review is:

- If 0 to 25% of below positive then consider that negative reviews. So, all reviews indicate that the teacher behavior and their teaching skills both are not good.
- If 25% to 50% positive reviews then we consider that teacher behavior and their teaching skill is average.
- If 50% to 75% of positives review then we consider that teacher behavior and their teaching skill are good. He or she is applicable for teaching subjects.
- If 75% above of positive reviews then we consider that teacher behavior and their teaching skill is excellent. He or she is applicable for teaching subjects. So he or she is good in teaching profession.

5. METHODOLOGY

The proposed methodology is based on Classification using Data Mining Techniques. The process can be discussing in detail as follows.

5.1 NAÏVE BAYES ALGORITHM

In machine learning, the naïve Bayes classifier is based on Bayes theorem. The naïve Bayes is used to find probability. The naïve Bayes is the supervised data mining technique used for classification. Naive Bayes based on the probabilistic technique where the classification is based on the probability. We use naïve Bayes as it can give output in form of error predicting and hence can be able to rank each prediction. Naïve Bayes provide error in prediction value that can be used to rank subject and assigned the top ranked subject to teacher.

Naive Bayes model is easy to build and particularly useful for very large data sets. Along with simplicity, Naive Bayes is known to outperform even highly sophisticated classification methods. Bayes theorem provides a way of calculating posterior probability $P(c/x)$ from $P(c)$, $P(x)$ and $P(x/c)$. Look at the Eq.(1) below [1]:

$$P\left(\frac{c}{x}\right) = \frac{P(x/c)P(c)}{P(x)}$$

$$P\left(\frac{c}{x}\right) = P(x/c) \times P(x/c) \times \dots \times P(x_n/c) \quad (1)$$

where;

$P(c/x)$ is the posterior probability of class (c , target) given predictor (x , attributes).

$P(c)$ is the prior probability of class.

$P(x/c)$ is the likelihood which is the probability of predictor given class.

$P(x)$ is the prior probability of predictor.

The nave Bayes theorem is make it easier for rank to teacher according to teacher's criteria and then giving to assign subject or domain for teaching. Naive Bayes is based on possibility. Then the algorithms can provide error in prediction form that can be used to rank subject and assigned the top ranked subject to teacher.

In the Table.2, we arranged all the user data and gives the possible output using algorithm and receiving the prediction values. The highest prediction values indicates that first rank, shown in Table.2.

Table.2. Prediction Values According to Naïve Bayes

S. No.	Candidates	Prediction Values
1	Akshay	0.749
2	Pramod	0.354
3	Ragini	0.351
4	Vikas	0.603
5	Aakash	0.351
6	Komal	0.416
7	Kamya	0.351
8	Rajesh	0.419
9	Amit	0.603

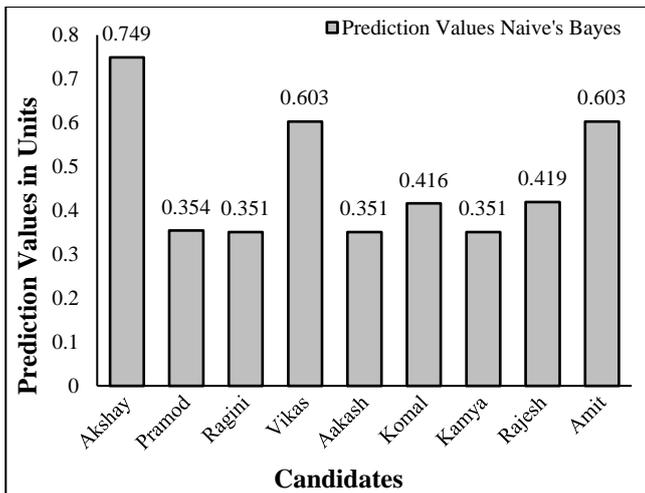


Fig.4. Prediction values based on Naïve Bayes Algorithm

In this paper, we are using two classifiers i.e., naïve Bayes and decision trees classifier. In above chart shows that prediction values base on naïve Bayes classifier. There are nine faculty members shown in the above chart and mention in table no. 2 with their prediction's prediction indicates that all the nine faculty members or teachers has assign or allocate their subject using naïve Bayes classifiers. Only naïve Bayes classifier can find prediction in this project. A decision tree does not give proper prediction. So, we can consider only naïve Bayes prediction values.

The teacher ranking systems are allocating the subject like Data mining to Akshay with prediction 0.749. The system also gives subject like Cloud computing to the Pramod with 0.354 predictions. Ragini and Vikas should also assigning their subject with 0.351 and 0.603 prediction's projects are allocate the subjects to Aakash, Komal, Kamyra, Rajesh and Amit with their prediction are as 0.351,0.416,0.351,0.419 and 0.603.

5.1.1 Advantages:

- Naive Bayes classifier to make or become better classification execute by take away of the unrelated features.
- Naïve Bayes has performed in high standard with high quality.
- It is small amount of calculation time in hours or minutes.
- Naïve Bayes are comparably easy to understand and build.
- It's easily to teach, even with a small dataset.
- It is moving or capable of moving at high speed.
- It's not responsive to means damaged easily.

5.1.2 Disadvantages:

- It supposed to be the case of all possible attributes is self-determining, which isn't regular the case.
- The naive Bayes classifier makes necessary a very large number of records or data or documentation to obtain better outcomes.
- It is occurrence-based or slow in that they supply all the training samples.

5.2 DECISION TREES ALGORITHM

The main important concept of decision trees is supervised learning algorithm. Decision trees is easy to understand and easy to use. The decision trees show the action by using Weka analysis tool. The decision trees start from training data and construct the predictive design which is mapped to tree structure. The decision tree have main goal to achieve accurate classification with minimum number of decision or not always possible noise in data.

The simple algorithm for decision tree is:

1. Start with trained data.
2. Select values with dimension that gives best split.
3. Create a child node using split.
4. Recurs on each child using child node data until stopping criterion is reached.

5.3 DECISION TREE WITH WEKA ID3

The famous decision trees construct algorithm is ID3 (Iterative Dichotomize 3) is invented by Ross Quinlan [1]. Weka has executed this algorithm and uses it for our demo. Weka allow the generation of the J48 algorithm. In this system, we are using decision trees algorithm. We design performance analysis of accuracy and time required both the graph is also generated.

Advantages:

- ID3 algorithm usually utilize formal features for classification with present all values.
- It manufactures incorrect alarm rate and expanding the detection rate and reducing the space utilization.

Disadvantages:

- It has lengthy searching time.
- It captures the large amount of memory than the C4.5 to large program implementation.

6. RESULTS AND PERFORMANCE ANALYSIS

The proposed system is worked on two algorithm are Naïve Bayes algorithm and decision tree algorithm. The dataset is stored in database which is in Wamp server. In this system, two graph is generated first is accuracy and time required to build the model. The result of the proposed system is presented in the graph format. The Fig.5 shows the result analysis of proposed system. In this graph the whole data set is analyzed and finding the weightage. We are considering data as users all data and also consider subjects values as assigned subject with theirs prediction values. In this graph, the proposed system is actual working in that way and giving the proper output to the admin. Now, we are analyzing few subjects only.

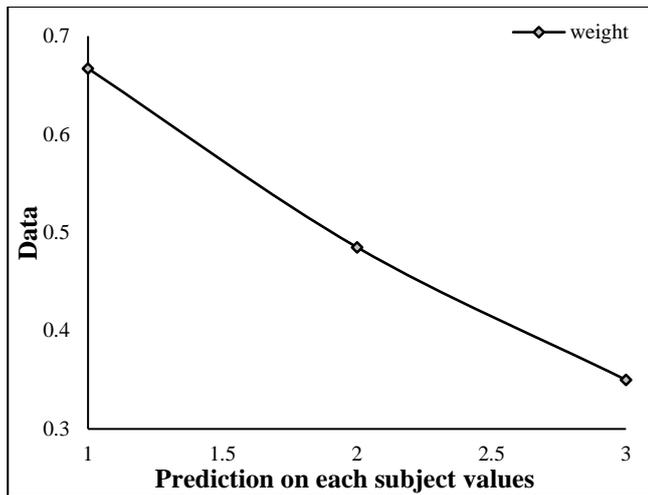


Fig.5. Result Analysis

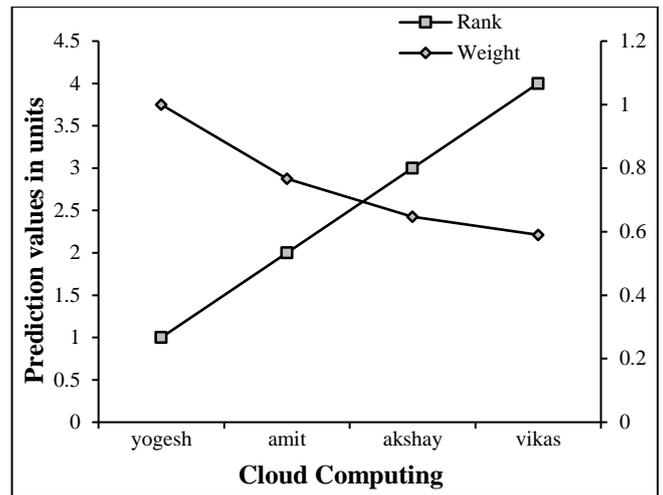


Fig.8. Cloud Computing Subject Wise Rank

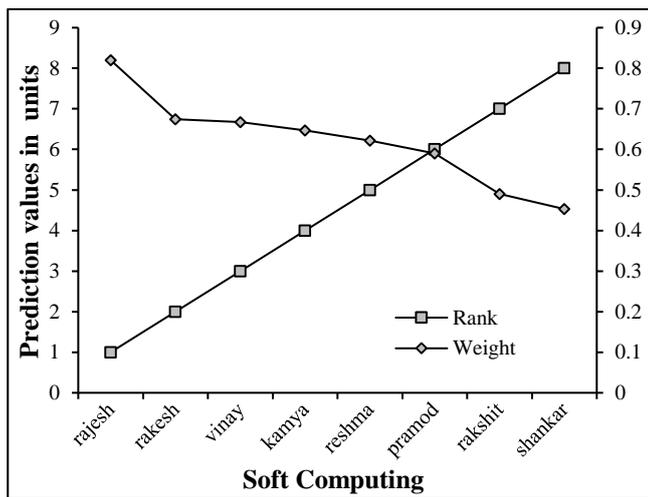


Fig.6. Soft Computing Subject Wise Rank

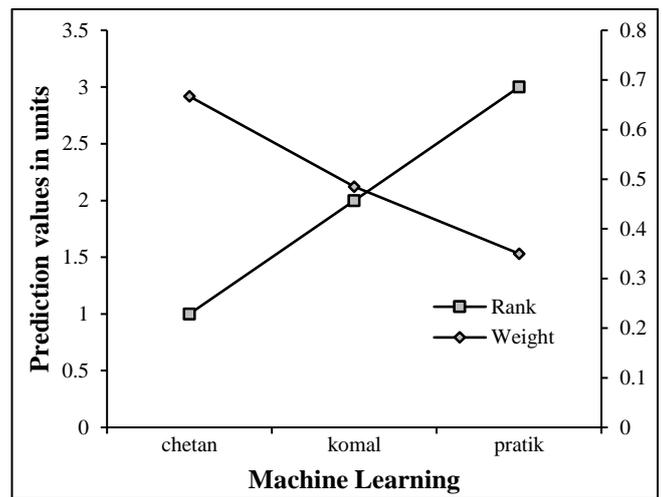


Fig.9. Machine Learning Subject Wised Rank

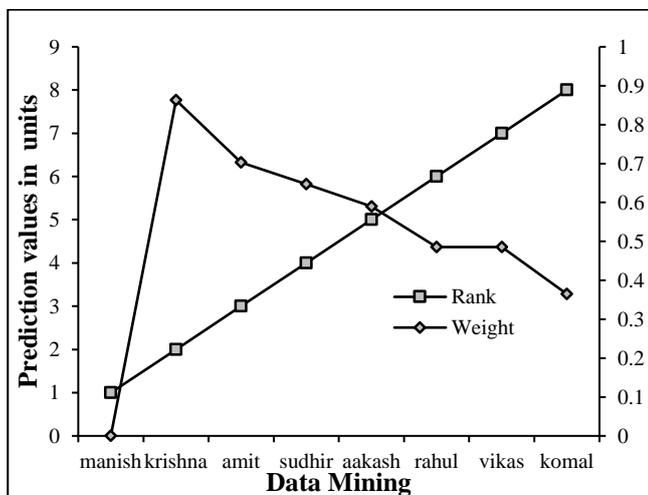


Fig.7. Data Mining Subjects Wise Rank

In the above, four graphs shows the subject wise results. Fig.6 explained that, in soft computing subject there are eight teachers or user list are available. The list is based on rank and weight. Admin is assigned the soft computing subjects to the first rank teacher name as Rajesh. Rajesh has good teaching experience. He done the projects worked on soft computing. Student's reviews about Rajesh are also 75% above i.e. excellent. So, the Rajesh is best than other user or teachers.

The Fig.7 explains that, in Data Mining subject there are eight teachers or users are available in list. The list is based on rank and weight. Admin is assigned the Data Mining subjects to the first rank teacher name as Manish. Manish has good teaching experience. He done the projects worked on Data Mining. Student's reviews about Manish are also 75% above i.e. excellent. So, the Manish is best than other user or teachers are available in list. In this list, Rajesh is present in last position in the rank. He is best in soft computing subject not in Data Mining.

The Fig.8 explains that, in Cloud Computing subject there are only four teachers or users are present in this list. The data is created by using algorithm. The list is based on rank and weight. Admin is assigned the Cloud Computing subjects to the first rank teacher name as Yogesh. Yogesh has good teaching experience.

He done the projects worked on Cloud computing. Student's reviews about Yogesh are also 75% above i.e. excellent. So, the Yogesh is best than other user or teachers are available in list.

The Fig.9 explains that, in Machine Learning subject there are only three teachers or user list are available. The list is based on rank and weight. Admin is assigned the Machine Learning subjects to the first rank teacher name as Chetan. Chetan has good teaching experience. He done the projects worked on Machine Learning. Student's reviews about Chetan are also 75% above i.e. excellent. So, the Chetan is best than other user or teachers are available in list.

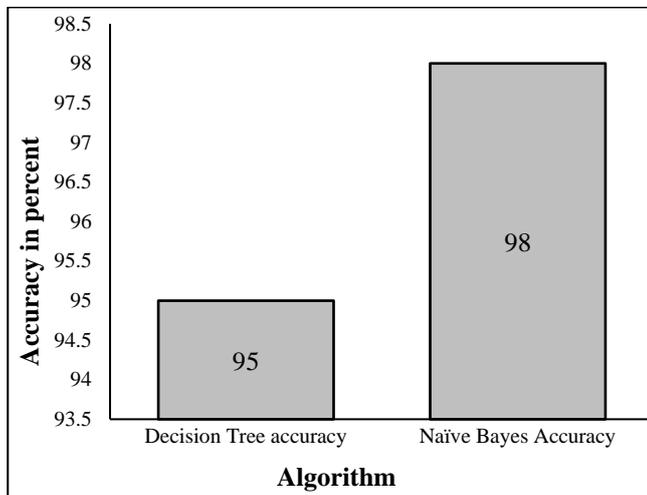


Fig.10. Performance Analysis Graph (Accuracy)

A comparative analysis of the performance of the models was carried out. For the comparison purpose, we have applied ID3 decision tree algorithm and executed using same dataset, but the results is not appropriate. So, we can find the accuracy by using Naïve Bayes algorithm.

In Performance Analysis Graph, we are only comparing both the algorithms and choose the best one. The above graph Fig.10 display that the accuracy of decision tree is 95% and accuracy of the Naïve Bayes algorithm is 98%. So, the Naïve Bayes algorithm is highest accuracy. This algorithm is better than decision tree algorithm. Therefore we can use Naïve Bayes algorithm.

Naïve Bayes classifier always keeps highest accuracy for any dataset with huge number of records. Decision trees come back only decision they will not able to grade the output. Hence, we are use naïve Bayes algorithm. Naïve Bayes complete the task within short time. The less time is required for Naïve Bayes algorithm. Decision tree had more time to complete the task. So, Naïve Bayes is faster than decision tree algorithm.

Naïve Bayes always manage high precision values for any dataset with large records. In the particular case, Decision trees always give only decision they will unable to show the output in the form of rank. Hence, we are use naïve Bayes as compare to decision trees.

In Fig.11, the decision tree consumed less time as compared to Naïve Bayes but the prediction values were same in every data enter in proposed system. The prediction values always show 1. So the ranking is not possible in such case. In decision tree, ranking is not possible, they provide same values each time when the system runs.

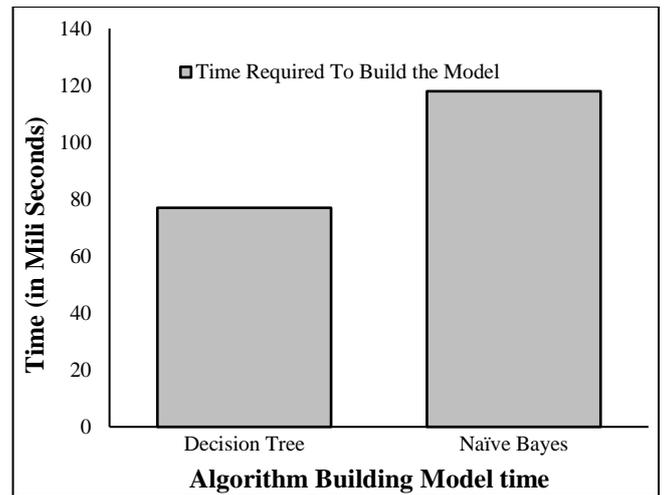


Fig.11. Performance Analysis Graph (Time required to build model)

7. CONCLUSION

Faculty members are performance and behavior to maintain standard in higher education fields. As a conclusion, we have evaluated teacher's ranking system. The teacher ranking system using two algorithm naïve Bayes and decision trees algorithm. Both the classification algorithm gives accurate results. So, the best classification algorithm is Naïve Bayes classifiers as compare to decision trees classifier. Naïve Bayes classifier has the lowest average error as compared to others.

In this paper, we are design teacher ranking system to give the rank or grade to teacher as per the assigning subject or domain using classification and clustering methods. This system is helpful for all departments of colleges. It reduces the teaching load distribution. It will help Head of Department (HOD) as per department level and principle as college or institute level.

In future scope, the system is handling all the colleges' data. All work is assigned by system. This system is also applied in company. In company, all the employees' data enter in system and assigning the designation according to their work, resumes data and behaviors. So, the system is helpful and useful to the administrator of the any department.

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