

Promotion Prediction Using Machine Learning

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Abstract: The Promotion of employees is an important element of human resources management, and the core content of talent development, and play an important role in promoting the harmonious development of enterprises. Promotion of employees is difficult but very important and sensitive and comprehensive part there should be no mistakes.

To avoid the adverse consequences caused by uncertainty, use the fuzzy comprehensive evaluation for promotion scientifically, which can get very good results. This is paper which will provide the in-depth description of difficulties in comprehensive evaluation, and according to the theory and method, and to construct a suitable fuzzy comprehensive evaluation model for promotion prediction of employees. Elected according to the model managers, capable of performing their job requirements. The article provides a good way for leadership of a company to address the issue of staff promotion.

Keywords: Attributes, Classification, Machine Learning, naïve bayes algorithm, Prediction.

I. INTRODUCTION

It has been observed in certain service industry sectors such as Information Technology that there is always a pressure for promotion to a higher grade. In a multi-grade human resource system where employee engagement and motivation is managed through promotion and monetary benefits, there is a substantial pressure in the organization especially during the annual appraisal period. [2]

Promotions are intended to provide recognition for proficiency and contribution by the employees, prevent attrition of talent and also communicate a greater expectation of performance in future periods. Typically, promotion process considers

- a) seniority in terms of number of years of service in the organization
- b) contribution to the organization measured through revenue or other performance measure
- c) seniority in terms of academic achievements, years of service in a specific grade and rating on performance measures.

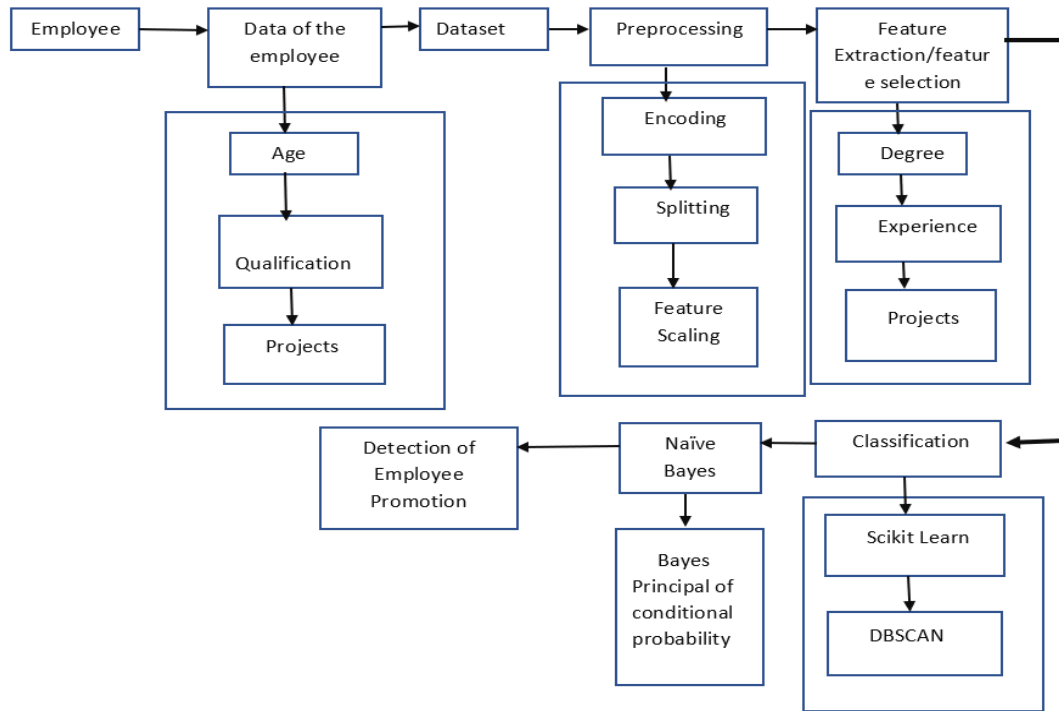
II. METHODOLOGY

All classification methods are supervised learning and decision tree techniques that classify data item into predefined class label. It is one of the most useful techniques in data mining to build classification models from an input data set. The classification techniques used here commonly builds prototypes which are used to estimate future data developments. The basic algorithm for decision tree induction is a greedy algorithm that constructs decision trees in a top-down recursive divide and conquer manner.[3]

classification is very fascinating topic for researchers as it helps in efficiently and accurately in classification of the data for getting some meaning out from the data. Decision tree are popular because they help to classify data in human readable way and is also easy to interpret than other methods for classification. Here the classification is used in the database of employees for the predication of employee performance on the basis of trained dataset.

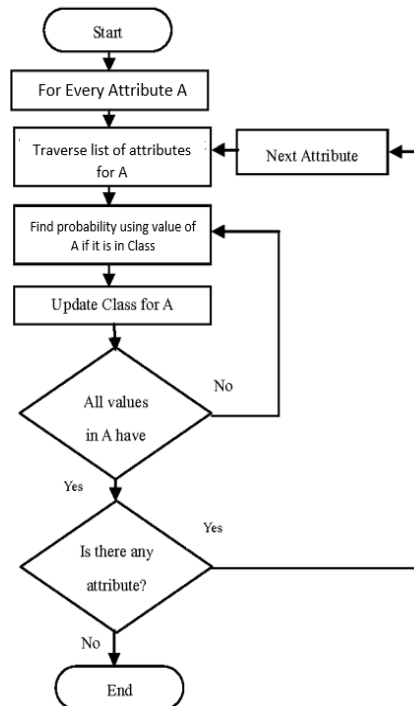
As there are many ways for classification the decision tree method is used for classification of data for measuring the performance of employee in the organization. There is lot of information like seminar attendance, age qualification, number of project worked on. This all helps in prediction of the promotion effectively.

III. ARCHITECTURAL DIAGRAM



This are the steps which can be useful in taking the maximum advantage of naïve bayes algorithm by providing it right attributes and Clean data so that overall data generated will be most accurate .

Figure 1 Architecture Design



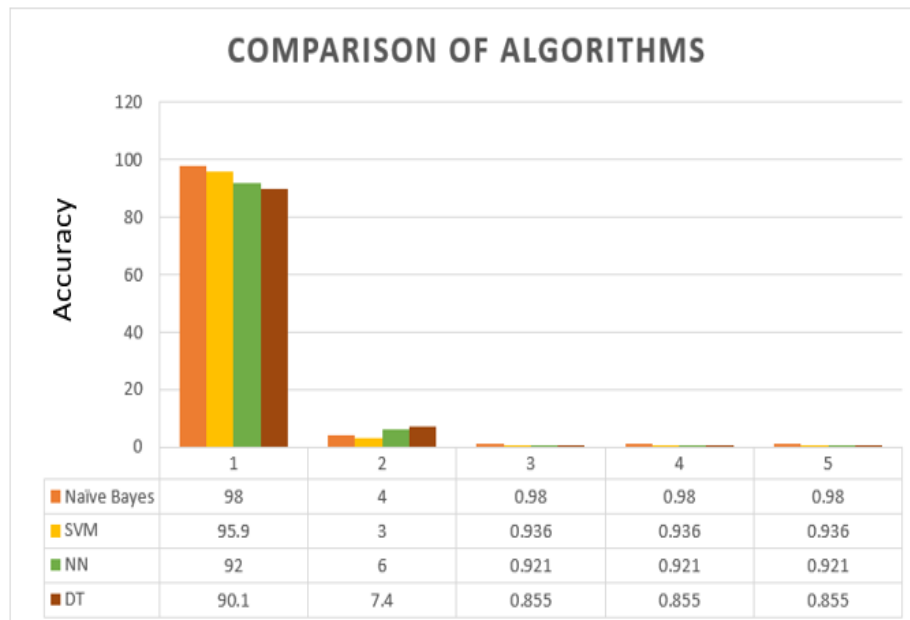
Naïve bayes algorithm is often used in recommendation systems sentiment analysis spamfiltering etc we also use this because it can perform better than other models of algorithm and requires much less training data.

Figure 2 Naïve bayes Algorithm Flowchart

$$P(A/B) = \frac{P(A/B) \cdot P(A)}{P(B)}$$

Is based on bayes theorem it is used for solving classification problems .[3]It is mainly used for text classification with high dimensional training dataset.Is one of the simple and effective classification algorithm which can be used by machine learning models for quick predictions.

Figure 3 Naïve Bayes Classifier Formula



Results

Naïve Bayes algorithm Works well with small dataset as well.[7] This algorithm works quickly and also saves lot of time. It is suitable for solving the problems which are multi-class prediction problems. If the independence of features that it assumes holds true, it can also outperform other machine learning models and needs a lot less training data.

Figure 4 Comparison of Algorithm with naïve bayes algorithm

Naïve Bayes Classifier Working

Fruit= {Yellow, Sweet, long} =Attribute set

Fruit	Yellow	Sweet	Long	Total
Orange	350	452	0	600
Banana	400	300	350	400
Others	50	100	50	150
Total	800	850	400	1200

$$P(A/B) = \frac{P(A/B) \cdot P(A)}{P(B)}$$

$$P(B)$$

Find Which fruit is most Yellow most Sweet and most long.

1 Probability of yellow given that fruit is orange

$$P(\text{Yellow/Orange}) = \frac{P(\text{Orange/Yellow}) \cdot P(\text{Yellow})}{P(\text{Orange})}$$

$$= \frac{350/800 \cdot 800/1200}{650/1200}$$

$$= 0.5$$

So, 2 probabilities of sweet given that fruit is orange $P(\text{Sweet/Orange}) = 0.69$

And 3 probabilities of Long given that fruit is orange $P(\text{Long/Orange}) = 0$

So, 4 Probability fruit is orange which is most Yellow Sweet and Long $P(\text{Fruit/Orange}) = 0.53 \cdot 0.69 \cdot 0 = 0$

5 Same for Banana

$$P(\text{Fruit/Banana}) = 1 \cdot 0.75 \cdot 0.87 = 0.65$$

6 Same for others category fruits

$$P(\text{Fruit/Others}) = 0.33 \cdot 0.66 \cdot 0.33 = 0.07$$

So here the highest probability of the fruit being Yellow Sweet Long is Banana as it is 0.65 as also the common sense hence the working

The Naive Bayes algorithm performs far better than numerical variables when you have categorical input variables. It manages data that is continuous and discrete. With regard to the quantity of predictors and data points, it is quite scalable. It is quick and capable of making forecasts in the present. The Bayes theorem's premise of conditional probability is the basis for how the Naive Bayes classifier operates.[9]

Figure 5 Naïve Bayes Classifier Working

IV. CONCLUSION

- Naïve Bayes is so popular because it give High Accuracy and easier to interpret than other classification methods. In this task, a trained dataset is used to forecast employee performance using a classification task applied to the employee database. The Naive Bayes method is employed by organisations to gauge an employee's performance because there are numerous approaches for data classification. To forecast the employee's success at the end of the year, data such as attendance, papers given, and seminars attended were gathered from the employee's prior records. This study aids in determining whether to offer an employee in an educational institution a yearly raise, a promotion, or other opportunities for career progress. It handles both continuous and discrete data, is straightforward and simple to build, doesn't need as much training data, and is capable of handling both. It can handle a large number of predictors and data points.

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