

Optimality of Naïve Bayes Classifier in Comparison to Other Complex Classifiers

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ABSTRACT

The simple Bayes classifier is known to be optimal when the attributes are independent in the data given the classes. However, Pazani et al [1] suggest that Naïve Bayes performs well in many domains which contain attribute dependencies and they also suggest that this classifier often outperforms more powerful classifiers. We reproduce these suggestions and verify if it is consistent with software datasets. We also check how Naïve Bayes and other classifiers perform when the SMOTE method is performed on the skewed dataset.

In this paper, we compare Naïve Bayes classifier with 9 other classifiers under different conditions and give an analysis of how Naïve Bayes compares against the other classifiers.

CCS Concepts

Computing methodologies → Supervised learning by classification • Computing methodologies → Cross-validation;

Keywords

SMOTE, sklearn, ...

1. INTRODUCTION

In the field of machine learning, supervised learning problems are those where classification models learn the model from a set of training examples and their corresponding class labels, then outputs a classifier. Now, the classifier takes unlabeled data and assigns it to the class label.

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5.1 Setup

Python with Numpy and Sci-Kit Learn libraries been used to perform the experiment on a Macintosh operating system.

10 Classifiers as mentioned in the previous sections including Naïve Bayes has been used on 10 software datasets. The datasets are taken from the Promise repository[2].

5.2 Preprocessing

SMOTE technique has been performed on the training dataset since the datasets are skewed (i.e positive to negative ratio of the labels was much greater or less than 1).

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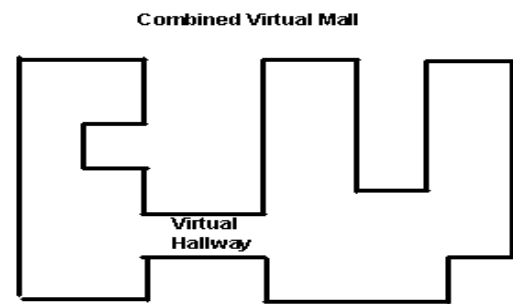


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6. ACKNOWLEDGMENTS

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