An Overview Of Oral Cancer Prediction And Classification Using Adaboost Classifier

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Abstract: Accuracy is one of the key elements in the disease diagnose. The development of many machine learning methods for analysis in cancer classification has brought a lot of improvement in healthcare. Currently, it seems that there is highly demanded further development of efficient classification methods to address the expansion of healthcare industry. Thus, it is important to select most relevant attributes to generate the optimal accuracy. The objective of this study is to classify more accurately the presence of oral cancer at the primary stage with reduced number of attributes. Machine Learning technique, Adaboost classifier is used for detecting the oral cancer with high accuracy with perfect parameter values for better classification. The performance of the proposed method is developed based on accuracy. The present study proves that the classifier methods can automatically detection the presence of oral cancer more accurately than any other methods.

***Index Terms* - Adaboost classifier, Oral cancer, Classification methods, Machine Learning, Early diagnosis.**

Introduction

Cancer is a non-communicable and chronic disease. In modern health epidemics, cancer is the second important and common disease in developed countries. In developing countries, Oral cancer is a challenging health issue, accounting for almost a third of the total cancers in India. In India, the prevalence of oral cancer is high, especially among the low socioeconomic classes. According to World Health Organization (WHO), 30-40% of people are affected by Oral cancer in India, which is considerably higher than other countries. Early detection is seen as an important element in reducing the mortality rate of deadly disease. A numerous type of conventional methods like biopsy, spectroscopic are used to detect oral cancer. The early detection of oral cancer is an important key factor in reducing the death rate. By early diagnosis of oral cancer, in turn enhances early treatment to the patients which improves the survival rate. The difficulty in detecting diseases has attracted many experts to study the solutions from the perspectives of both medical and computer science. A variety of machine learning methods in data mining and artificial intelligence such as feature selection (FS) and classifications are applied in the diagnosis of diseases. Both FS processes and classification techniques are capable of producing the most relevant features in building an efficient classifier. In addition, they can also eliminate noise in achieving a classification with higher accuracy. With advancements in science and technology, various techniques are developed to detect oral cancer. In current scenario, Machine Learning and its related techniques are used for better oral cancer detection. This proposal focuses on one of the Machine Learning technique Adaboost classifier, used for detecting the oral cancer with high accuracy.

I. INTERDISCIPLINARY RELEVANCE

The overall goal of oral cancer management is to improve the quality of life and productivity of people by,

- Early diagnosis.

- Early examination may help localize a malignancy.
- Radiographic finding helps to find the location, size of the neoplasm.

Health Care: As machine learning and data science are starting to be adopted as a tool in healthcare applications, the industry is slowly pushing the boundaries on what it can do. Its primary function will most likely involve data analysis based on the fact that each patient generates large volumes of health data. Machine learning in healthcare informatics presents many challenges to machine learning researchers, including high dimensional feature vectors, limited sample sizes, complex and interdependent patient features and the sometimes poorly understood relationships between patient features and the final diagnosis / prognosis.

Physicians in Decision Making: At Health Catalyst, we use a proprietary platform to analyze data, and loop it back in real time to physicians to aid in clinical decision making. At the same time a physician sees a patient and enters symptoms, data, and test results into the EMR, there's machine learning behind the scenes looking at everything about that patient, and prompting the doctor with useful information for making a diagnosis, ordering a test, or suggesting a preventive screening. Long term, the capabilities will reach into all aspects of medicine as we get more useable, better integrated data. We'll be able to incorporate bigger sets of data that can be analyzed and compared in real time to provide all kinds of information to the provider and patient.

Medical Diagnosis: Health Catalyst believes the introduction and widespread use of machine learning in healthcare will be one of the most important, life-saving technologies ever introduced. The opportunities are virtually limitless for the technology to improve and accelerate clinical, workflow, and financial outcomes. Machine learning can reduce readmissions in a targeted, efficient, and patient-centered manner.

II. SIGNIFICANCE OF THE STUDY

The goal of oral cancer detection is used to identify the cancer at early stage, which gives greater chance to cure the cancer. Machine Learning (ML) is one of the outstanding innovations in technology, used in biomedical science. In Machine Learning, numerous techniques are used to identify and detect oral cancer with high accuracy. The ability of ML techniques to detect key features of complex datasets and these techniques are applied in cancer detection for getting effective and accurate decision making.

Adaboost classifier is a highly accurate classifier or strong classifier which offer error rate close to 0. AdaBoost classifier tracks the model that failed the accurate prediction and affects less by the overfitting problem. This work uses adaboost classifier for detecting oral cancer. The work can be extended with Genetic Algorithm to implement the automation of oral cancer analysis.

III. METHODOLOGY

Classification is one of the important decision-making techniques for detecting oral cancer. The main objective of this work is to classify the data using adaboost classifier to detect oral cancer. AdaBoost classifier is an iterative ensemble method which builds a strong classifier by combining multiple classifiers. so, it will produce high accuracy during classification. Adaboostworks the following steps:

1. Adaboost selects a training set randomly.

2. It iteratively trains AdaBoost model by selecting the training set based on the accurate prediction of the last training.

3. It assigns the higher weight to wrong classified observations. So, the next iteration of observations will get the high probability for classification.

4. It assigns weight to the trained classifier in all iterations, according to the accuracy of the classifier.

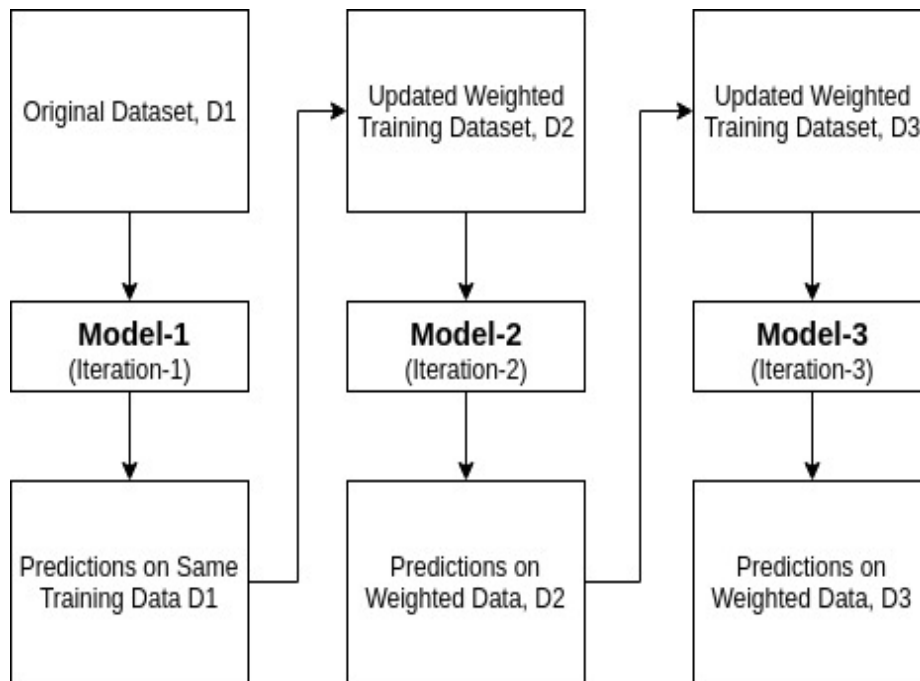5. This process iterate until the complete training data fits without any error.

Figure 1. Steps Involved in Adaboost Classifier

IV. CONCLUSION

The early intervention can reduce the prevalence of oral cancer advancements. Oral Cancer is a major health concern of the developing and developed nations across the globe. This devastating disease accounts for the 30% deaths around the world annually. The promise of prevention, treatment, and cure for oral cancer can only be realized through the vigorous support of scientific research efforts ranging from fundamental discovery research to clinical trials and translation of scientific findings into clinical practice.

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