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A Novel Coronavirus Prediction Model Based on Naïve Bayes

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ABSTRACT

Any area of life, including medicine, is quickly impacted by technological breakthroughs. The use of AI to analyse data and make decisions has shown encouraging outcomes in the healthcare industry. COVID-19 has quickly spread to over 100 nations. The future repercussions might affect people everywhere. Creating a control system that can identify the coronavirus is of the utmost importance. Disease diagnostics using a variety of AI techniques might be one way to regulate the present chaos. In this study, we used classical and ensemble ML algorithms to categorise textual clinical reports into four groups. Word bag, report length, and term frequency/inverse document frequency (TF/IDF) were some of the methods used for feature engineering. Both ensemble and standard machine learning classifiers were fed these characteristics. With a testing accuracy of 96.2%,

logistic regression and multinomial naive bayes outperformed other ML methods. A recurrent neural network may provide more precise results in the future.

Keywords: COVID-19, ML, High accuracy, AI.

INTRODUCTION

The main objective of this project is It is imperative to develop a control system that will detect the coronavirus. One of the solution to control the current havoc can be the diagnosis of disease with the help of various AI tools.

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The outbreak of the novel coronavirus disease 2019 (COVID-19) in late 2019 has posed unprecedented challenges to healthcare systems worldwide. As the pandemic continues to evolve, early and accurate detection of COVID-19 cases remains crucial for effective disease management, resource allocation, and public health interventions. Machine learning (ML) techniques have emerged as powerful tools in the battle against COVID-19, particularly when applied to clinical text data.

Clinical text data encompass a wide range of information, including electronic health records (EHRs), radiology reports, medical notes, and patient narratives. This rich source of unstructured data contains valuable insights that can aid in the timely identification and monitoring of COVID-19 cases. In this context, ML-based approaches have demonstrated their potential in assisting healthcare professionals, researchers, and policymakers by automating the detection and analysis of COVID-19-related information embedded in clinical text data.

EXISTING SYSTEM

Machine learning and natural language processing use big data-based models for pattern recognition, explanation, and prediction. NLP has gained much interest in recent years, mostly in the field of text analytics, Classification is one of the major task in text mining and can be performed using different algorithms. Since the latest data published by Johns Hopkins gives the metadata of these images. The data consists of clinical reports in the form of text in this paper, we are classifying that text into four different categories of diseases such that it can help in detecting coronavirus from earlier clinical symptoms. We used supervised machine learning techniques for classifying the text into four different categories COVID, SARS, ARDS and Both (COVID, ARDS). We are also using ensemble learning techniques for classification.

PROPOSED SYSTEM

The proposed a machine learning model that can predict a person affected with COVID-19 and has the possibility to develop acute respiratory distress syndrome (ARDS). The proposed model resulted in 80% of accuracy. The samples of 53 patients were used for training their model and are restricted to two Chinese hospitals. ML can be used to diagnose COVID-19 which needs a

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lot of research effort but is not yet widely operational. Since less work is being done on diagnosis and predicting using text, we used machine learning and ensemble learning models to classify the clinical reports into four categories of viruses.

WORKING METHODOLOGY

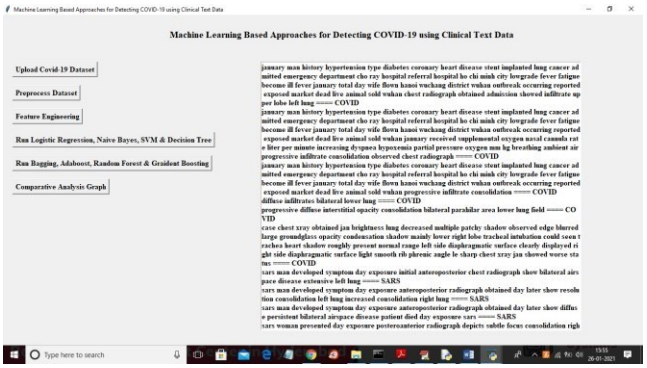
This paper aims to provide an overview of the application of machine learning-based approaches for detecting COVID-19 using clinical text data. We will explore the following key aspects:

Importance of Clinical Text Data: Clinical text data play a pivotal role in healthcare as they capture a patient's medical history, symptoms, treatments, and outcomes. Leveraging this textual information for COVID-19 detection offers a holistic view of the patient's condition, aiding in more accurate diagnoses.

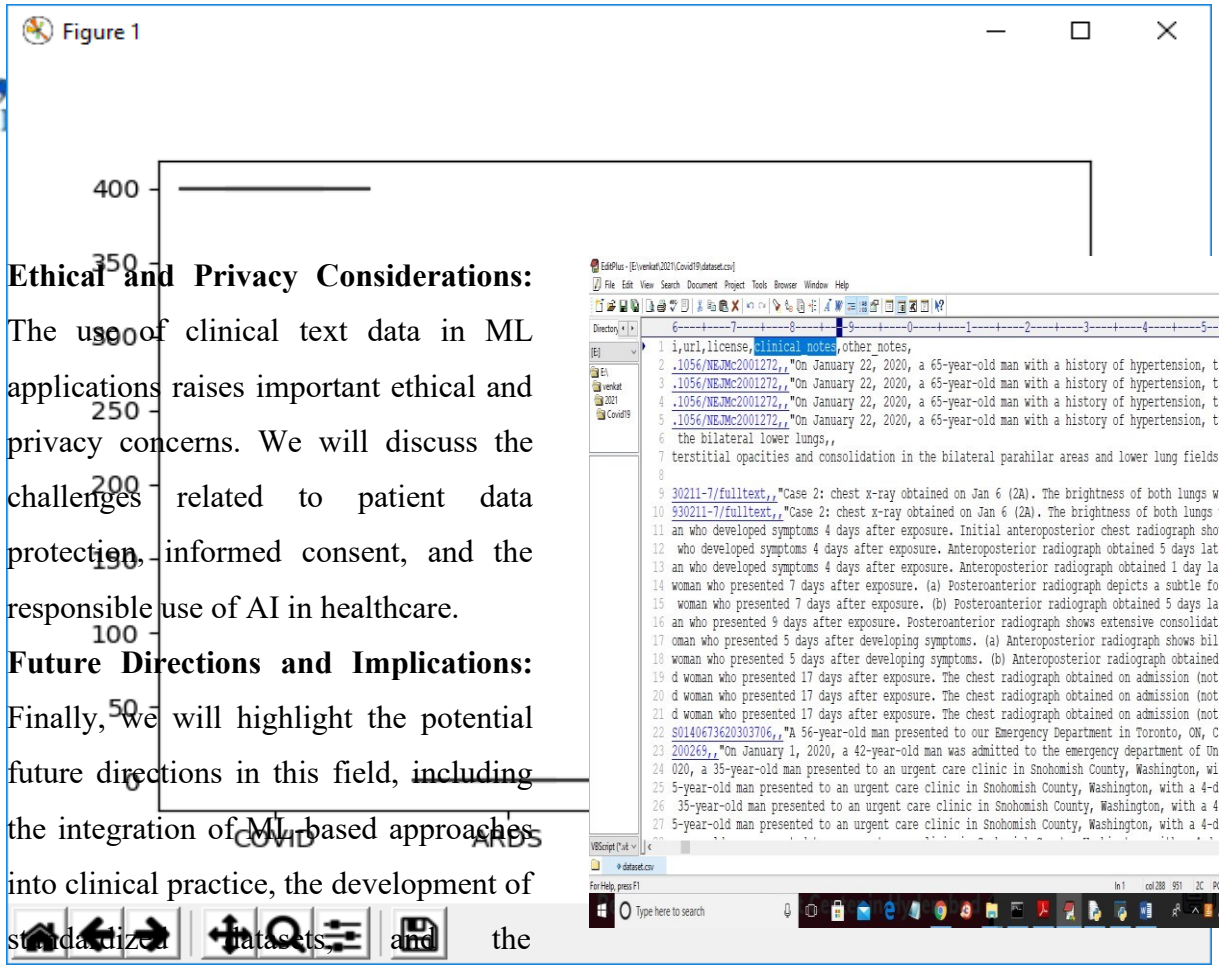
Challenges in COVID-19 Detection: We will discuss the challenges in diagnosing COVID-19, including the variability in symptoms, the need for rapid testing, and the potential for asymptomatic carriers. These challenges underscore the importance of ML-based approaches that can handle diverse and evolving clinical scenarios.

Machine Learning Techniques: We will delve into various ML techniques employed for COVID-19 detection, such as natural language processing (NLP), deep learning, and ensemble methods. These techniques enable the extraction of meaningful patterns and insights from clinical text data, facilitating early diagnosis and decision-making.

Data Sources: The availability and quality of clinical text data are essential factors in developing effective ML models. We will explore the sources of clinical text data, including EHRs, radiology reports, and social media, and discuss the advantages and limitations of each.

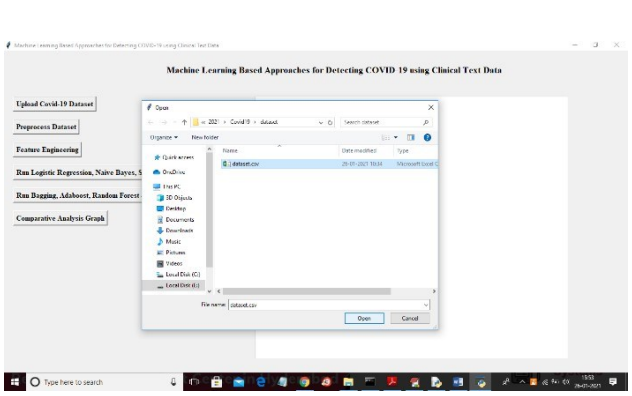


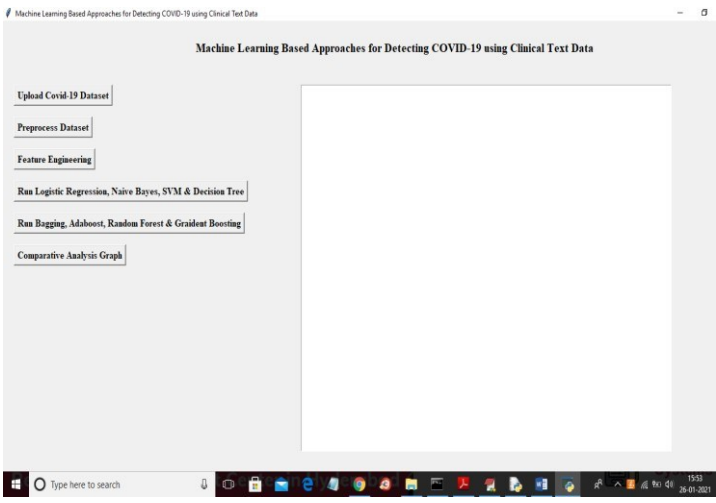
Model Performance and Validation: Evaluating the performance of ML models for COVID-19 detection is critical. We will examine different metrics and validation techniques used to assess the accuracy, sensitivity, specificity, and generalizability of these models.

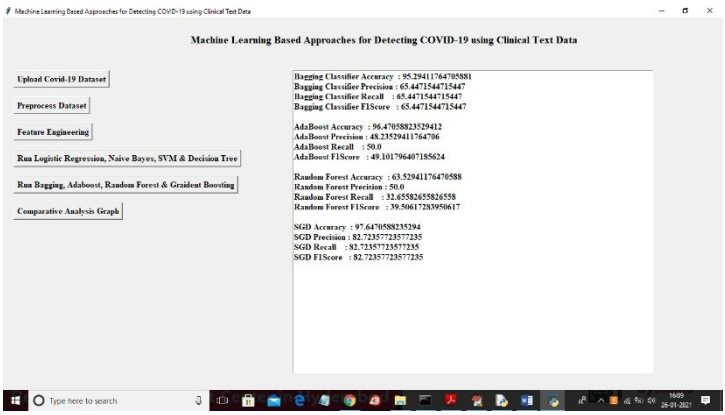


Ethical and Privacy Considerations: The use of clinical text data in ML applications raises important ethical and privacy concerns. We will discuss the challenges related to patient data protection, informed consent, and the responsible use of AI in healthcare.

Future Directions and Implications: Finally, we will highlight the potential future directions in this field, including the integration of ML-based approaches into clinical practice, the development of standardized datasets, and the implications for public health policy.







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CONCLUSION

COVID-19 has shocked the world due to its non-availability of vaccine or drug. Various researchers are working for conquering this deadly virus. We used 212 clinical reports which are labelled in four classes namely COVID, SARS, ARDS and both (COVID, ARDS).

Various features like TF/IDF, bag of words are being extracted from these clinical reports. The machine learning algorithms are used for classifying clinical reports into four different classes. After performing classification, it was revealed that logistic regression

and multinomial Naı¨ve Bayesian classifier gives excellent results by having 94% precision, 96% recall, 95% f1 score and accuracy 96.2%. Various other machine learning algorithms that showed better results were random forest, stochastic gradient boosting, decision trees and boosting. The efficiency of models can be improved by increasing the amount of data. Also, the disease can be classified on the gender-based such that we can getinformation about whether male are affected more or females. More feature engineering is needed for better results and deep learning approach can be used in future.

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