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Integrating Artificial Intelligence in Telemedicine: Predicting Lung Cancer Disease and Decision-Making

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INTRODUCTION & AIM

Rural areas in Nepal face significant healthcare delivery challenges due to their remote and difficult-to-reach locations. The advent of AI is revolutionizing numerous sectors, and healthcare is no exception (Liu et al., 2020). Many inhabitants of these regions are deprived of timely and adequate medical attention, leading to exacerbated health issues and higher mortality rates (Nepal Health Research Council, 2017). This study presented and investigates the application of machine learning techniques in diagnosing lung cancer, a prevalent and often fatal disease. By collecting data from a remote village in Nepal, including parameters such as age, alcohol consumption, coughing, chest pain, and shortness of breath, the study used various machine learning algorithms, including Naive Bayes, Support Vector Machines, and Random Forest, are evaluated to determine the most accurate method for predicting lung cancer among the surveyed population. The objectives of this study are a) Prediction of Lung cancer disease for disease management. b) Combining AI into medical diagnosis for better decision making.

METHOD

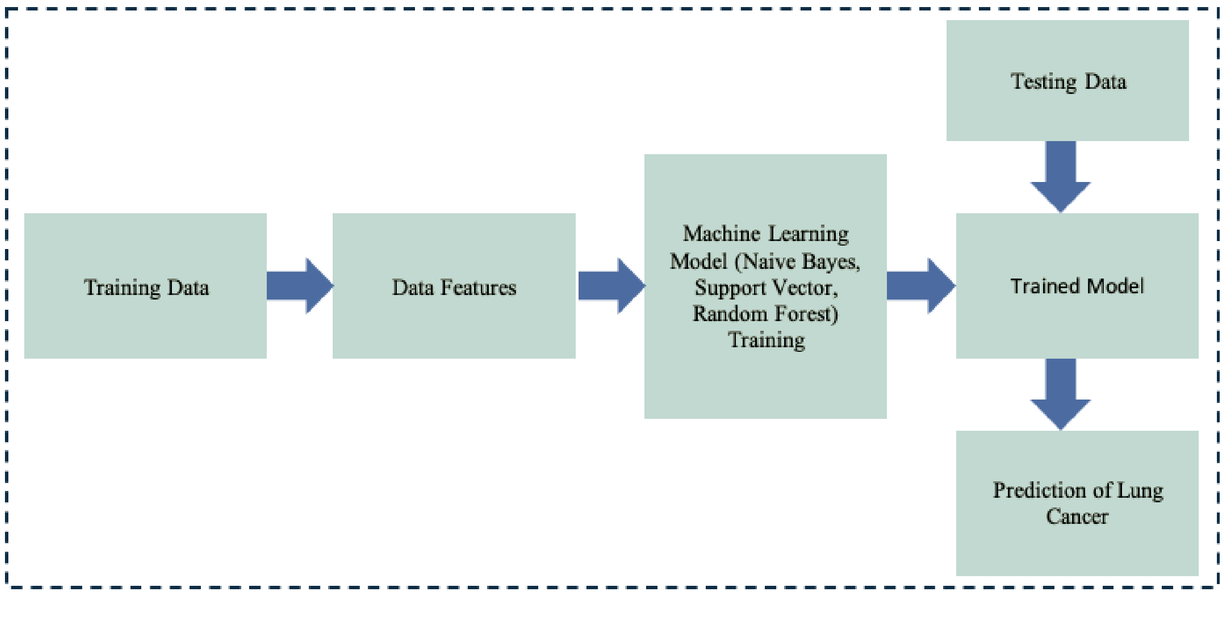


Figure 1: Framework for Lung cancer disease prediction

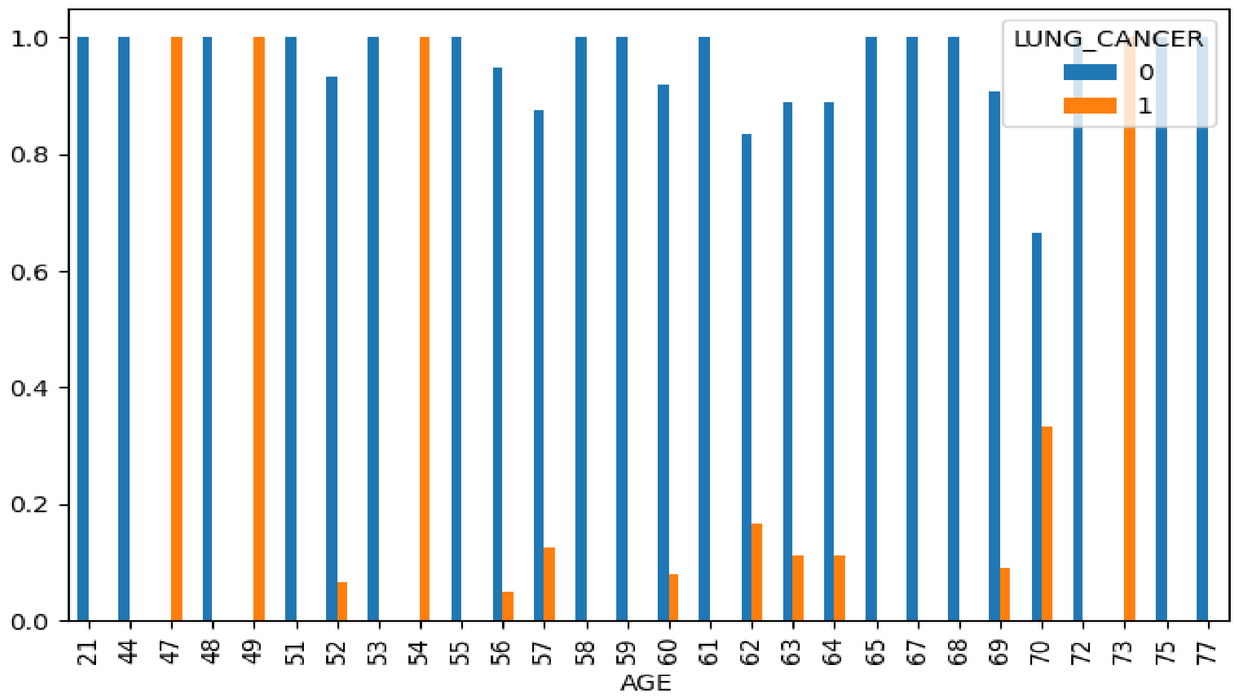
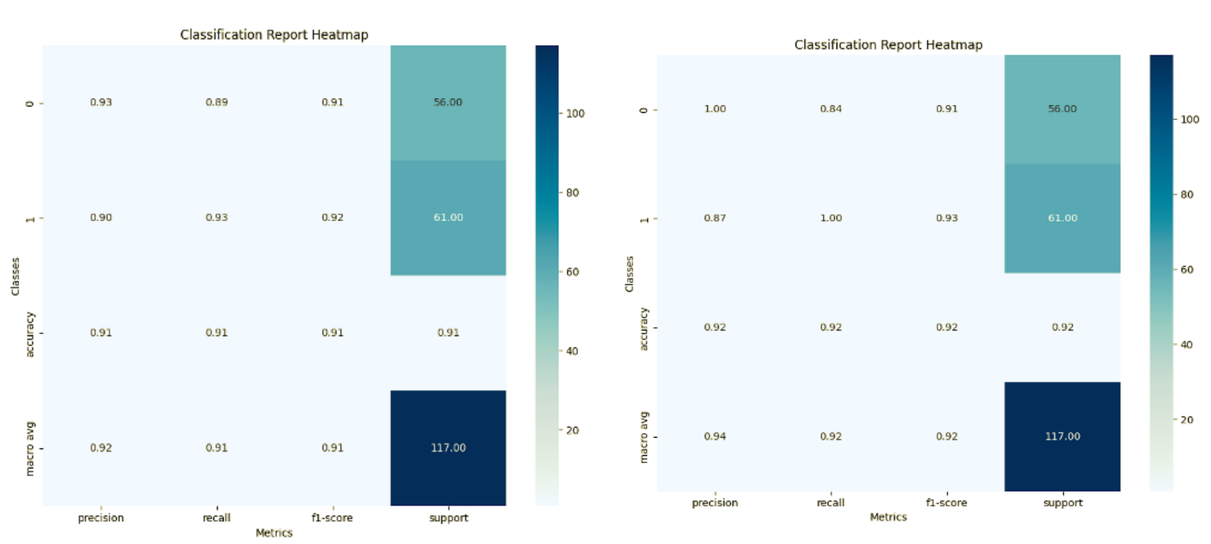


Figure 2: Distribution by age

RESULTS & DISCUSSION



Methods	Accuracy	Precision	Recall	F1-Score
Naive Bayes	0.91	0.92	0.91	0.91
Support Vector Machine	0.92	0.94	0.92	0.92
Random Forest	0.95	0.95	0.95	0.95

Methods	Naive Bayes	Support Vector Machine	Random Forest
Average Accuracy	0.897	0.915	0.946

Figure 3: Classification report of Naive Bayes , Support vector machine and Random Forest ML , F-Score Comparison and Accuracy after 12 fold cross validation

K-Fold cross-validation is a widely used technique in machine learning for the purpose of evaluating and selecting models. 12-Fold cross-validation is a reliable technique for evaluating models as it utilizes all the accessible data for both training and testing purposes.

CONCLUSION

By comparing the performance of Naive Bayes, Support Vector Machine, and Random Forest algorithms, the research demonstrates that Random Forest achieves the highest average accuracy (94.6%) in predicting lung cancer, while Naive Bayes shows the lowest average accuracy (89.7%). Moreover, the study identifies key risk factors for lung cancer, such as age and alcohol consumption, which can inform targeted interventions and resource allocation. Despite the promising results, there are limitations regarding data privacy and the potential for misinformation.

FUTURE WORK / REFERENCES

Future advancements could incorporate deep learning neural networks and big data techniques, along with image processing capabilities, to further enhance AI's role in telemedicine.

- Nepal Health Research Council. (2017). Nepal Health Facility Survey. Kathmandu: Nepal Health Research Council.
- Liu, Y., Altman, R. B., Xu, J. (2020). Artificial intelligence in Oncology: Current Progress and Future Directions. Journal of Clinical Oncology, 38, 90-97