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A Disease Prediction Bot Using Machine Learning and Gradio

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A B S T R A C T:

With the advancement of artificial intelligence (AI) and machine learning (ML), healthcare solutions are evolving to provide early disease detection and improve patient outcomes. This paper presents a disease prediction system that leverages machine learning techniques to analyze user-reported symptoms and predict potential illnesses. The system is implemented using a Decision Tree Classifier, trained on a structured medical dataset containing symptom-disease relationships. The proposed model utilizes a predefined set of symptoms, which users can select through an interactive Gradio web interface. Based on the selected symptoms, the trained ML model predicts the most probable disease, providing disease descriptions and suggested precautions. The system is deployed on Hugging Face Spaces, enabling real time accessibility and ease of use. This research highlights the potential of AI-driven disease prediction systems in revolutionizing healthcare by offering early diagnosis, accessibility, and improved patient awareness, ultimately assisting users in making informed health decisions.

Keywords : Health Care, Supervised Machine Learning, Disease Prediction, Gradio , Html

Introduction

A disease prediction system is an advanced healthcare tool that enables users to input symptoms, receive potential diagnoses, and gain valuable health insights. This system leverages AI and machine learning (ML) to analyze medical data, improving early disease detection and patient awareness. 1 By utilizing deep learning, our system enhances diagnostic accuracy by identifying complex patterns in medical symptoms. This approach revolutionizes healthcare by providing early detection of diseases, empowering users to take proactive health measures. AI-driven disease prediction has wide-reaching impacts on healthcare, research, and telemedicine. Medical professionals use such systems to assist in diagnosing conditions, improving patient care, and reducing the burden on healthcare facilities. Healthcare providers can use AI-based disease prediction systems to improve treatment planning and patient monitoring. Additionally, governments and public health organizations can utilize such technologies to monitor disease outbreaks and gather valuable health data for better policymaking. While many AI-driven healthcare solutions are freely accessible, some platforms offer premium features for advanced analysis, while others rely on research funding and medical partnerships.

Research Objectives

The primary objective is to build a deep learning-based system for automatic pnemonia detection.
Key goals include:

- Developing a ResNet-50 based CNN for image classification.
- Preprocessing X-ray images using OpenCV to enhance clarity and uniformity.
- Designing a responsive and intuitive web-based UI using Flask for real-time predictions.
- Evaluating model performance using metrics such as accuracy, precision, recall, and F1-score.
- Ensuring model generalizability and robustness through extensive validation and testing.

Literature Survey

Various disease prediction methodologies rely on analyzing patient symptoms and medical data to identify patterns that help differentiate between different health conditions. Specifically, numerous features are extracted from patient-reported symptoms, medical histories, and datasets, which are then processed using machine learning algorithms to build a classifier capable of predicting diseases accurately. A crucial step in this research is acquiring a suitable dataset for training and testing AI models. To ensure the reliability of our model, we explored various medical datasets from publicly available sources and research articles. By leveraging real world medical datasets and machine learning techniques, our system provides an accurate, data driven approach to disease prediction, offering a powerful tool for early detection and better healthcare outcomes.

Methodology and Processed Method

The Disease prediction system is built with machine learning (ML) techniques, including a Decision Tree Classifier, to analyze user-reported symptoms and predict likely diseases.The methodology takes an organized approach that includes data collection, preprocessing, model training, evaluation, and deployment using a Gradio-based interface on Hugging Face Spaces.

1. Data collection and preprocessing

- Dataset Selection: The system utilizes a structured dataset that includes:
- Symptoms (Input features): A set of specified symptoms linked with specific diseases.
- Prognosis (Diseases) (Target Variable): The diagnosed condition that causes a specific collection of symptoms.
- Disease Descriptions and Precautions: Additional information on each disease, including prevention strategies.
- Data Preprocessing: The pre processing processes guarantee the dataset is structured and ready for training.
- Feature Selection
- Label Encoding
- Data Cleaning

2. Model Training and Development

- Machine Learning Model It can handle multi-class classification and manage structured symptom-disease correlations effectively. A decision tree classifier is selected for Disease prediction.

3. Model Evaluation

- A validation dataset is used to evaluate the trained model, and performance measures are examined to improve forecasts.

4. Disease Prediction Mechanism

- Processing User Input: Using a Gradio checkbox-based user interface, users choose symptoms to engage with the system.
- Disease Prediction & Model Inference: Following the selection of symptoms, the model analyzes the data to generate a prediction:
- Identify the most likely Diseases.
- Get more data from datasets that have already been loaded.

5. User Interface and Deployment

- Gradio-Based UI Real-time disease prediction is made possible by the model's integration into an interface driven by Gradio. After the user chooses symptoms, the system offers:
- Disease Prognosis
- Disease Synopsis
- Preventive Actions
- Hosting on Hugging Face Spaces The model is deployed on Hugging Face Spaces, making it easily accessible via a web browser.

Conclusion and Future Scope

The development of an AI-powered disease prediction system using machine learning (ML) techniques has demonstrated the potential of automated healthcare solutions in improving early diagnosis and patient awareness. By leveraging a Decision Tree Classifier, the model effectively analyzes user-inputted symptoms and predicts the most probable disease. The integration of label encoding, structured medical datasets, and Gradio based UI ensures that the system provides accurate, interpretable, and user-friendly predictions. Furthermore, the deployment of the system on Hugging Face Spaces enhances its accessibility, allowing users to interact with the model in real time via a web-based interface. It showcases the impact of AI in healthcare, demonstrating how machine learning-driven disease prediction can contribute to early detection, better healthcare accessibility, and informed medical decision-making. Future improvements, such as the integration of deep learning models, larger medical datasets, and mobile application support, can further enhance the system's accuracy and usability. Overall, this work presents a scalable, efficient, and AI-driven approach to disease prediction, paving the way for more advanced, data-driven medical diagnostic tools that can assist both individuals and healthcare professionals in making better health related decisions.

Future Scope:

The deployment of this system on cloud platforms like AWS, Azure, or Google Cloud could enable massive scalability and uninterrupted service. Creating mobile and multilingual versions of the application will expand accessibility to users from different regions and backgrounds. Offline support

can be implemented for users in rural or low-internet areas. Moreover, embedding voice interfaces could enable access for illiterate or visually impaired users. These inclusivity-driven enhancements will ensure equitable healthcare access for all.

REFERENCES

[1] A. Kumar, S. Gupta, and P. Sharma. Machine Learning Approaches for Disease Prediction: A Review. International Journal of Medical Informatics, vol. 143, pp. 104271, 2020.

[2] J. Smith and L. Brown. AI in Healthcare: Early Disease Detection and Predictive Analytics. IEEE Transactions on Computational Biology and Bioinformatics, vol. 19, no. 4, pp. 987-1002, 2022.

[3] P. Patel, K. Verma, and S. Roy. Symptom-Based Disease Prediction Using Decision Trees. Proceedings of the 18th International Conference on Machine Learning and Healthcare, pp. 213-220, 2021.

[4] H. Ahmed, M. Ali, and J. Wang. Neural Networks for Medical Diagnosis: A Deep Learning Approach. Journal of Artificial Intelligence in Medicine, vol. 27, no. 3, pp. 145-160, 2019.

[5] Y. Chen, R. Fernandez, and K. Liu. Deployment of AI Models for Disease Prediction Using Gradio and Hugging Face. Proceedings of the 2022 IEEE International Conference on AI and Health, pp. 332-340, 2022.

[6] S. Kataria and R. Yadav, "A Survey on Disease Prediction Using Data Mining and Machine Learning Techniques," 3 International Journal of Computer Applications, vol. 180, no. 47, pp. 10–14, Jan. 2019.

[7] H. Chaurasia and V. Pal, "A Novel Approach for Disease Prediction Using Machine Learning and Natural Language Processing," International Journal of Engineering Research and Applications, vol. 10, no. 8, pp. 42–46, Aug. 2020.

[8] S. R. Satapathy and A. Mishra, "Healthcare Chatbot for Disease Prediction Using Machine Learning and NLP," IEEE Xplore, doi:10.1109/ICICCS51141.2021.9432292, May 2021.

[9] A. K. Jaiswal, S. Mishra, and A. Nigam, "Medical Chatbot for Diagnosis Using Decision Tree and Random Forest Algorithms," International Journal of Innovative Technology and Exploring Engineering, vol. 9, no. 3, pp. 245–250, Jan. 2020.

[10] T. Patel and N. Dave, "Smart Healthcare Bot Using Machine Learning," International Research Journal of Engineering and Technology (IRJET), vol. 7, no. 5, pp. 2880 2883, May 2020.