

# MEDICAL DIAGNOSIS SYSTEM TO ENHANCE GP DIAGNOSTIC USING ML



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## Abstract

In recent years, several Artificial Intelligent (AI) based applications were introduced to help General Practitioners (GPs) in predicting illnesses at early stages to order to improve patient quality of life, reduce medical expenses, and save lives.

In this project, we developed a medical diagnosis model that can help General Practices (GPs) predict most common diseases based on patient's symptoms, and we developed a friendly-user interface to test and use the model. The model is based on machine learning techniques to analyze the input parameters, which are the patient's symptoms, and output the predicated disease.

This system can assist medical professionals in personalizing treatments based on unique patient characteristics. This may result in treatments that are more effective and efficient. The obtained accuracy was within the range of 95%. The model was also evaluated by local GPs the results were very satisfactory.

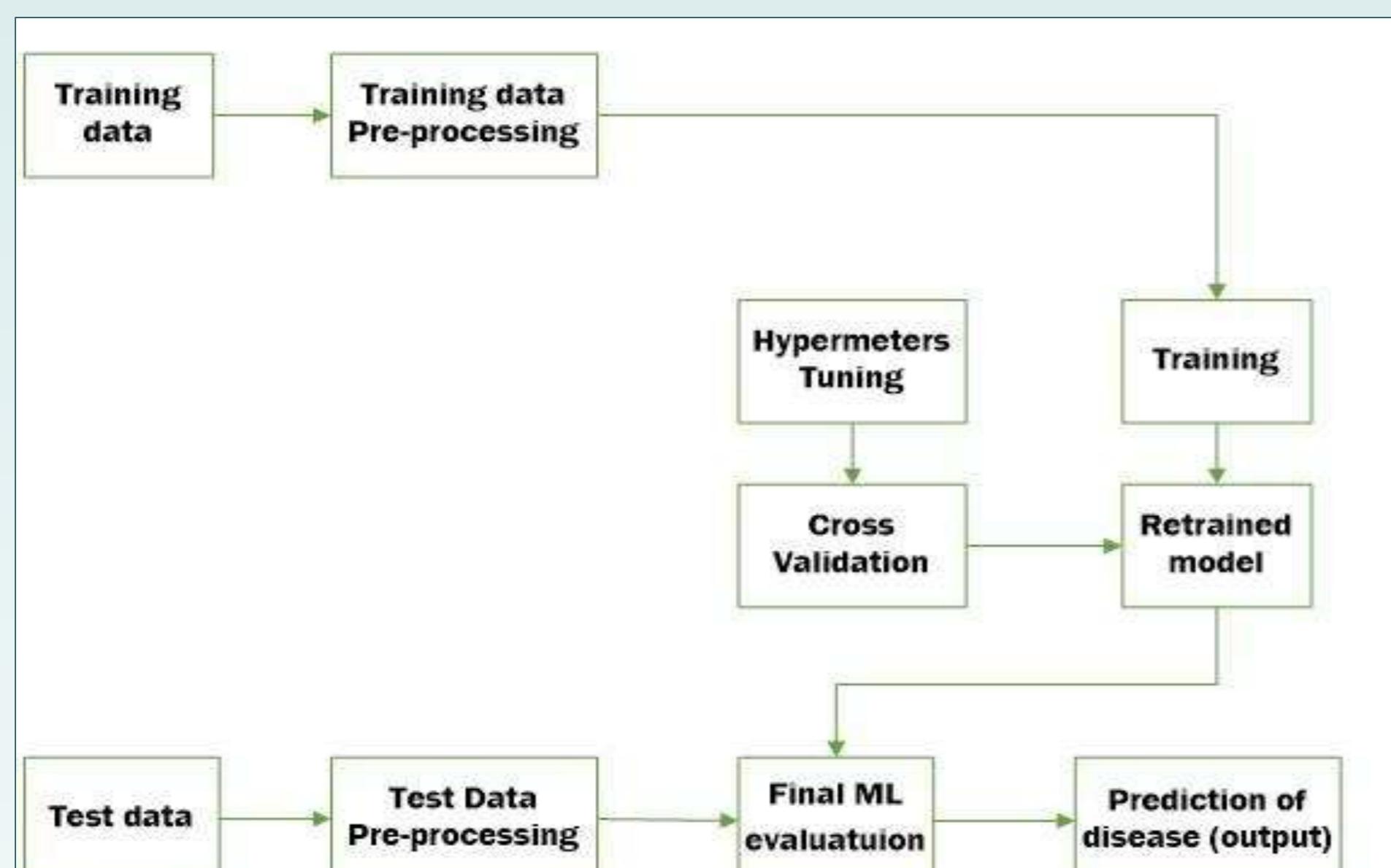
## Introduction

General practitioners frequently see many patients and spend little time with each individual when they want their services. This practice sometimes results in unwanted biases, errors, and exorbitant medical costs, affecting the quality of patient care. GPs are responsible for making the initial diagnosis, and clinical decisions are frequently made based on their intuition and experience. So poor clinical decisions can have disastrous consequences. It can also be challenging for the patient if they are not close to doctors and hospitals. So, if the diagnosis can be performed using automated software that saves time and money, it may be better for the patient and make the process run more smoothly.

The main objective of this project is to develop an AI model using Machine Learning Algorithms to predict or diagnose the disease of the patient using his symptoms and health data. The proposed model should have the ability to give GPs some new insights and perspectives to come up with new insights and associations it might draw attention to the significance of other unusual characteristics.

- Numerous people will benefit from this system, which they can utilize from anywhere and at any time.
- Will help predict unexpected diseases
- help clinicians in making correct decisions
- the system will be able to act as a web-based solution for medical symptom checkers

## Methodology



## Dataset

The dataset that was used consists of 132 symptoms, which when combined or staged, result in 41 adult diseases. It was collected from an online source; namely Kaggle. Also, it was used in several studies before. Given the 4920 rows as records from numerous patient samples. A different symptom and disease combination is represented by each row. The columns provide information about the disease name, symptoms, and the values that correspond to them. Both categorical and numerical data are present in the dataset.

## Tools

	Python programming language and its different libraries and framework
	Integrated Development Environments
	Web application framework written in Python

## Test Methods

This project was evaluated using multiple test methods. These tests allowed us to thoroughly evaluate the system's performance and validate its results in multiple ways.

- In the first approach, the model was evaluated using 40% of the online dataset as a testing set, achieving an accuracy of around 95%.
- The second approach involved collecting symptoms and disease information from various online sources and inputting them into the disease prediction system to generate a prediction. The system's performance was evaluated by comparing the predicted disease to the actual diagnosis, and it achieved very good accuracy.
- The third approach involved testing the model with a real General Practitioner to evaluate its performance in a real-world medical setting, achieving an accuracy of 80%.
- The fourth approach involved testing the web-application by specialist GPs and medical students, and their positive feedback indicated that the model was effective and easy to use.
- The fifth approach involved using a disease prediction survey to evaluate the accuracy of the system, and it also achieved a very good average accuracy.

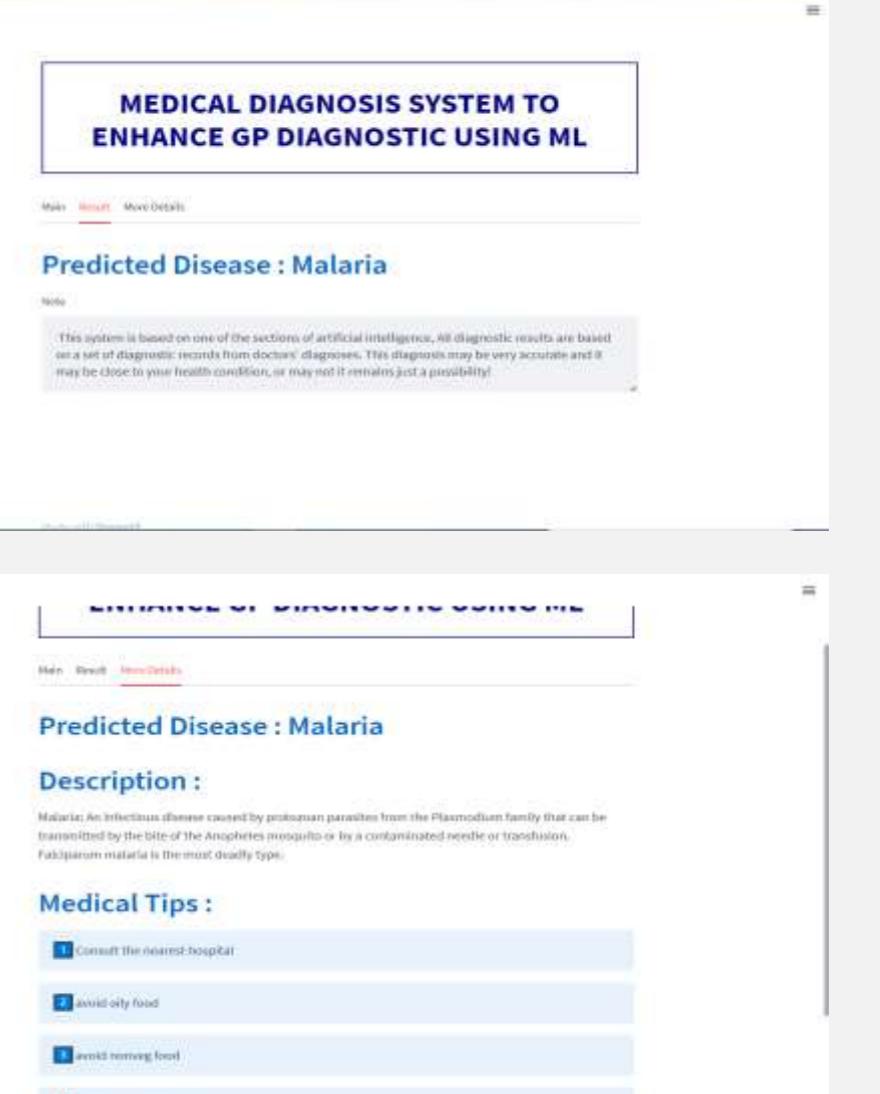
Overall, these test methods provided valuable insights into the performance of the Disease Prediction System and helped to improve its accuracy and reliability for use in medical diagnosis and decision-making.

## MEDICAL DIAGNOSIS SYSTEM TO ENHANCE GP DIAGNOSTIC APP

- Model User interface, the user is asked to Enter a fundus image.



- When symptoms are entered, the potential disease is displayed with a brief description of the disease and precautionary advice.



## Conclusion

This system has the potential to assist General Practitioners (GPs) with early screening and diagnosis of diseases based on patient symptoms. It uses a machine learning model, specifically the Naive Bayes algorithm, to provide a suggestive diagnosis based on input data. The dataset used contains 132 symptoms resulting in 41 adult diseases, including common and rare conditions. A UI is available to make the system more user-friendly. The accuracy of the diagnosis depends on the accuracy of the symptoms entered, with at least four symptoms required for a diagnosis. The model's accuracy on the testing set ranged between 80% and 95%, and its performance was evaluated by medical experts and demonstrated accuracy. While the system shows promise as a decision support tool for early screening of common diseases, proper human oversight is required to ensure the correctness of the diagnosis and take necessary measures for patient safety. The system could also benefit people living in remote areas with limited access to medical support. Further improvements, expert validation, and governance are needed before real-world deployment, and the system can complement but not replace the expertise of GPs and health professionals.

## Future Work

We seek to provide more applications for those in need to advance society in the future, and we would like to continue this work to make it a pioneering and marketable product, so we seek to add some updates in the future, including:

- explore the use of additional machine learning models to predict or diagnose multiple diseases. This could involve expanding the dataset to include a wider range of diseases and associated symptoms.
- Integrate other data including information like medical history, family history, lifestyle factors, lab test results, etc. along with symptoms to improve diagnosis.
- Deploy an app in Arabic / English language for patients and doctors to easily use the diagnosis system.