SYNOPSIS

ON

DESIGN AND DEVELOPMENT OF A CLINICAL DECISION SUPPORT RECOMMENDER SYSTEM

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Contents:

Introduction:

Healthcare is one of the most basic essentials for a human being in order to stay healthy. A healthy body is essential because it leads to a healthy environment, which in turn leads to a healthy country. One should strive to maintain good health in order to live up to their full potential. This may be done by getting routine check-ups, having easy access to medical treatment when unwell or wounded to prevent additional serious sickness, and getting routine eye and dental exams. Recent research shows that the internet plays an important role in how people manage their own health. People seek and greatly rely on the health information available online. Today, many people search for health-related information over the internet and make their decisions based on the information available. However, Online health information also presents some inherent challenges such as information reliability, authenticity, and user privacy issues. In order to solve this problem, we have made use of a recommender system.

Here in this project, we have designed a clinical decision support system (CDSS). It is a type of health information technology that provides clinicians, staff, patients, and other individuals with knowledge and individual-specific information that is intelligently filtered or presented at the appropriate time to improve health and health care. A CDSS focuses on the use of knowledge management to obtain clinical advice based on a variety of characteristics associated with patient data. It is reported that around 25 billion dollars are spent in correcting the mistakes as a result of misdiagnosis. This affects the patient's health outcome. With CDSS, physicians have greater chances of delivering accurate outcomes and avoiding mistakes. This solves the problem before showing an error. So, here in this project, we have tried to make a model which can predict any disease when we feed it with some symptoms. It will also give an in-depth overview of the working of the model, procedures, and the advantages associated with using these technologies.

Feasibility study:

Operational Feasibility:

The suggested system is operationally feasible because the project's final product can be implemented by hospitals (using Windows or Linux systems) and is user-friendly. The designed system has a graphic user interface and will present the information on the screen as required.

Technical Feasibility:

The proposed project is very feasible. When we see it from a technical perspective, the software requirements to develop the system are open-source based. We are not required any paid and non-existing technologies.

We are going to use the following software's to develop our system –

1. Python 3.10
2. Open CV
3. TensorFlow
4. NumPy
5. Pandas
6. Seaborn
7. Matplotlib
8. MySQL DB
9. VS code
10. Jupyter Notebook
11. Windows 10/11 OS

Economic Feasibility:

This is a crucial factor to take into account when creating a project. We choose the technology based on how affordable it is. Since the initiative is intended to meet the demands of the users, it is not financially problematic. The project only needs the barest minimum of resources. It doesn't require any more resources. The app can be downloaded by the user, who can then operate it.

Objectives:

1. State of art health recommender systems
2. Design and development of a clinical decision support recommender system.
3. Performance analysis of proposed system with existing systems.

Problem Statement:

Healthcare professionals around the world are constantly seeking more effective methods of diagnosing diseases in their early stages, as this can greatly improve patient outcomes and reduce healthcare costs. Traditional diagnostic methods rely heavily on clinical expertise and experience, which can lead to inaccuracies and missed diagnoses. In recent years, the field of disease prediction using machine learning and artificial intelligence has gained significant attention, as it has the potential to provide more accurate and timely diagnoses, and enable earlier interventions. However, there is a need to develop and validate disease prediction models that are reliable, interpretable, and scalable, in order to facilitate their adoption in clinical practice. The problem statement, therefore, is to design and develop disease prediction models using machine learning and artificial intelligence techniques that can accurately and efficiently predict the onset of various diseases, and enable earlier interventions that can improve patient outcomes and reduce healthcare costs.

Methodology:

Raw data: This is the initial data that is collected from various sources such as surveys, sensors, and other data collection methods. The data is usually in its raw form, which means it is unprocessed and contains a lot of noise, missing values, and inconsistencies.

EDA of raw data: EDA of raw data involves analysing and understanding the basic characteristics of the data, exploring distributions and relationships between variables, and identifying patterns and anomalies in the data. The goal is to gain insights into the data and identify potential issues that may affect the accuracy and reliability of our results.

Pre-processing: In this step, the raw data is cleaned, transformed, and formatted to make it usable for analysis. This involves removing any irrelevant data, handling missing values, converting data types, and dealing with outliers and inconsistencies.

EDA of pre-processed data: EDA of pre-processed data involves analysing and understanding the data after it has been cleaned, transformed, and standardized. This involves examining the basic characteristics of the data, exploring the distributions and relationships between variables, and identifying any remaining issues that may affect the accuracy and reliability of our results.

Feature selection: Once the data is cleaned and processed, the next step is to select the relevant features that will be used in the model. This involves analysing the data and selecting the most important features that will have the most impact on the model's performance.

Modeling: After selecting the relevant features, the next step is to build a model using machine learning algorithms. This involves selecting the appropriate algorithm and training the model on the data.

Optimization: Finally, the model needs to be optimized to improve its performance. This involves fine-tuning the model parameters, selecting different algorithms, and experimenting with different feature selections.

Performance analysis: Performance analysis is the process of measuring the accuracy and reliability of a model or algorithm. This involves analysing metrics such as accuracy, precision, recall, and F1 score using a test dataset. The goal is to identify potential issues and make improvements to the model to improve its performance. Overall, performance analysis is a crucial step in the data analysis process.

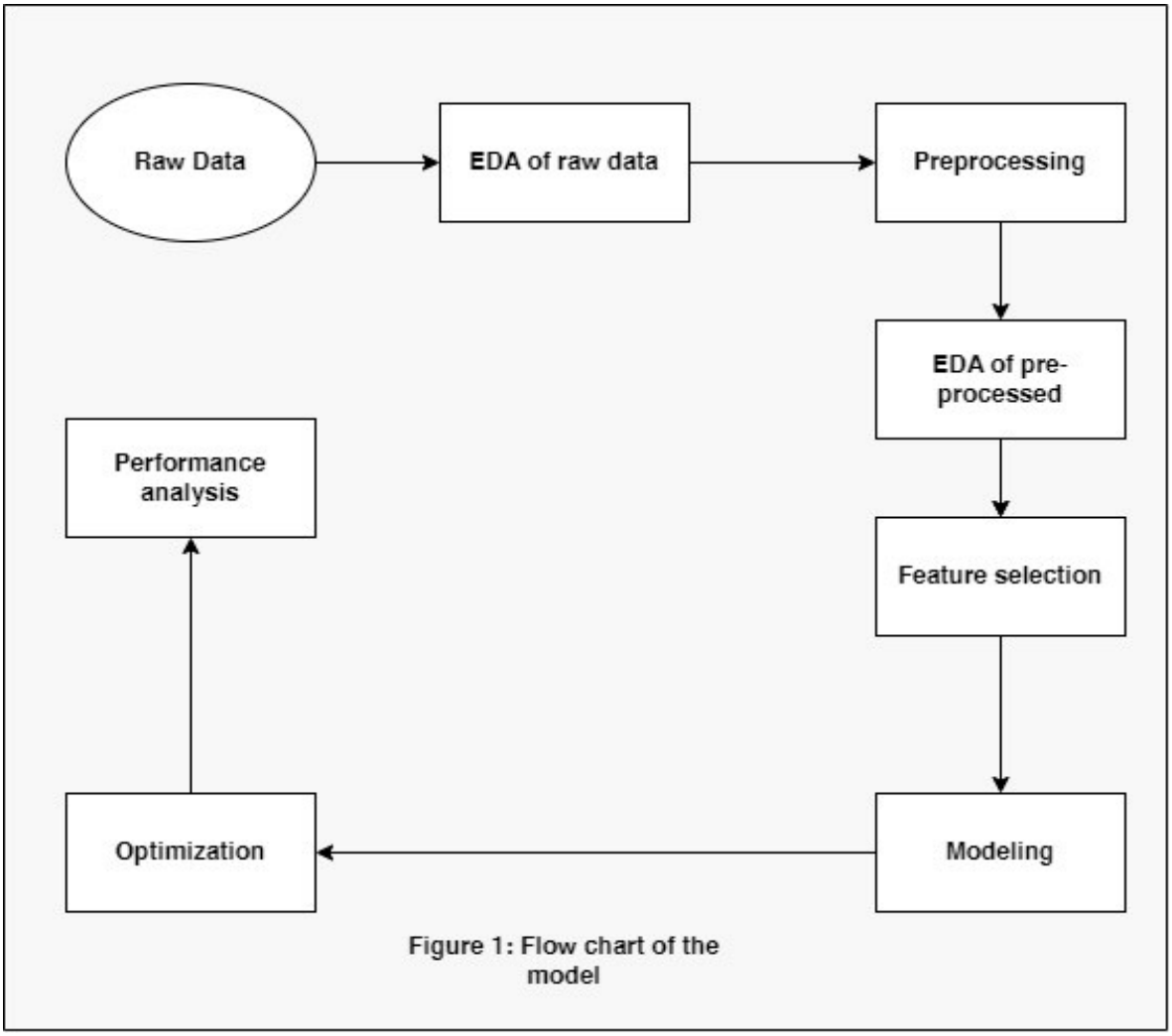

Figure 1: Flow chart of the model

Expected outcome:

Disease prediction models developed using machine learning and artificial intelligence techniques have shown promising results in accurately predicting the onset of various diseases in their early stages. These models have the potential to revolutionize healthcare by enabling earlier and more accurate diagnoses, improving patient outcomes, and reducing healthcare costs. Through continued research and development, these models have the potential to become an integral part of clinical practice, providing personalized and proactive healthcare for patients.

Facilities required for proposed work:

Hardware:

Processor	Intel I7 9th gen
Processor Speed	2.60 GHz
Hard Disk	1TB SSD
RAM	16GB GDDR6

Software:

Operating System	Windows 10/11
Programming language	Python 3.10
Code IDE	VS code/Jupyter Notebook
Machine learning Libraries	1. Open CV 2. TensorFlow 3.NumPy 4.Pandas 5.Seaborn 6.Matplotlib

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