Med Ease: ML-Driven Symptom Analysis with An Expert Doctor and Drug Recommendation System

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Abstract— The evolution of health care in the 21st century has been marked by an increasing reliance on technological advancements. The primary aim of our project is to develop a comprehensive and intelligent system that can analyze symptoms reported by patients and provide insightful recommendations with the assistance of an expert doctor.

The objectives include:

i. ***Med Ease excels at accurately recognizing disease names from given symptoms alongside Book an Appointment.***
ii. ***Beyond recognition, it integrates a robust disease identification model, tailoring medication recommendations based on diagnosed conditions.***
iii. ***The system further suggests alternative medicines and complementary treatments.***

The combination of AI, ML and Deep Learning with health care represents a seminal moment, as it endeavors to enhance not only the speed and accuracy of diagnostic processes but also the overall quality of patient care. Different techniques and methods have been used to implement this system, e.g., Regression Techniques, Voting Classifier, Decision Tree, Random Forest, and parameter tuning (increasing model accuracy).

I. INTRODUCTION

Our project emerges as a response to the critical challenges entrenched within the existing health care framework, marked by inefficiencies stemming from time constraints, resource limitations, and the escalating demand for medical services. Traditional health care systems, while robust, grapple with the complexities of providing timely and personalized care to an expanding population.

The primary objective is to revolutionize the diagnostic and treatment landscape by introducing a sophisticated system. This system, fortified by ML algorithms, collaborates seamlessly with expert medical professionals to meticulously analyze symptoms and deliver tailor-made drug recommendations.

The core ambition extends beyond mere streamlining; it aspires to democratize access to expert medical insights, thus contributing to the evolution of a health care ecosystem that is not only efficient and responsive but also inclusive, aligning with the evolving needs of our dynamic society.

II. LITERATURE SURVEY

There is a significant amount of literature on Med Ease. Some notable studies include:

1. "Symptoms-Based Disease Prediction Using Machine Learning Techniques" focuses on the prediction of diseases by analyzing patient symptoms through advanced machine learning models.
2. "Medicine Recommendation System" delves into the development of a system that recommends appropriate medicines based on patient information and medical history. Utilizing machine learning techniques, the study integrates patient data such as demographics, medical conditions, treatment history, and genetic factors to create a comprehensive profile for everyone.
3. "Alternative Medicine Recommendation System presents the design and implementation of an intelligent recommendation system for alternative medicine. Utilizing a combination of natural language processing and machine learning techniques, the system analyses user symptoms and preferences to suggest appropriate alternative treatments. Preliminary results indicate that the system can effectively match user conditions with relevant alternative treatments, enhancing the accessibility and acceptance of holistic healthcare options.
4. " Doctor Appointment Online Booking System an online platform for scheduling doctor appointments,

possibly incorporating machine learning for optimization. The system integrates user-friendly interfaces with backend functionalities to allow patients to book, modify, and cancel appointments with ease.

Existing system operates on the foundation of a machine learning algorithm, specifically designed to predict disease names by analysing input data, primarily consisting of symptoms reported by users.

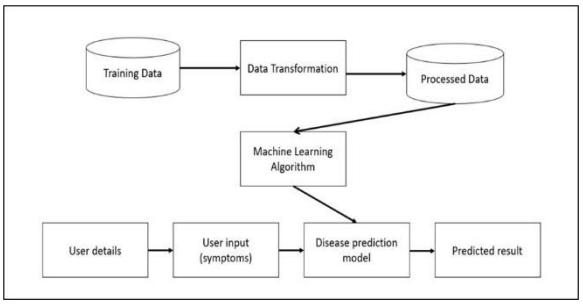

Fig 1.1 Existing System

III. PROPOSED SYSTEM

The proposed system is designed with a modular structure, each module serving a specific purpose to ensure efficient functionality and ease of maintenance. The division into modules enhances scalability, flexibility, and facilitates the integration of various components.

A. PATIENT

i. The system will allow user to register with phone number, name, the username (username must be unique), password.

ii. The system will allow the valid user to log in with his username and password.

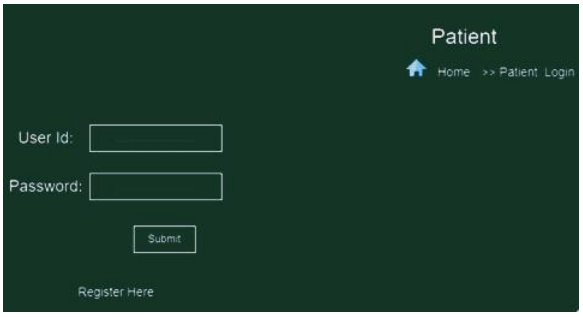

Fig 1.2 User Login Detail Layout

iii. The system will allow the user to enter symptoms (n number of symptoms separated by commas).

iv. The system will allow the user to view the predicted disease.

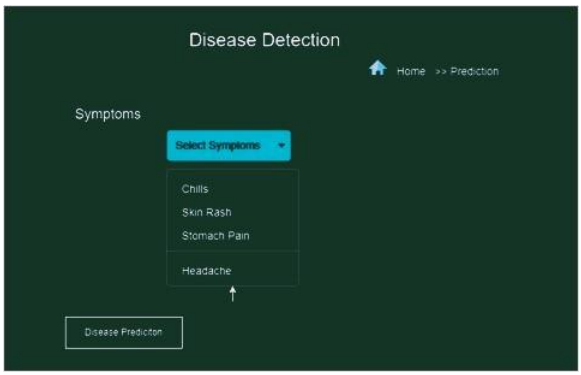

Fig 1.3 Disease Prediction Layout

v.

vi. The system will allow the user to see the list of doctors along with their details (all the attributes of doctors except username and password).

vii.

viii. The system will allow the user to select a doctor and book an appointment (while booking appointment patient details such as his name, gender, age, predicted disease should be sent to the doctor).

Fig1.4 Booking an appointment Layout

B. DOCTOR

i. The system will allow doctors to log in with a username and password.

ii.

iii. The system will allow doctors to view all the appointment requests of users.

iv.

v. The system will allow doctors to schedule the appointments.

Fig1.5 Doctor's login page

vi. The system will allow the doctor to send notifications to the user on the scheduled timings.
vii. The ratings of the doctor will be calculated based on the average of all ratings provided by the user.
viii. The system will allow the user to view his (doctor) ratings.

IV. SYSTEM IMPLEMENTATION

The figure. , the patients and doctors will be registered with this system and the administrator will analyse the classification techniques with help of multiple disease datasets and determine the best model based on the highest accuracy.

The patient will authenticate with this system and select the disease symptoms as input then this system will predict the diagnosis disease with the best classification model

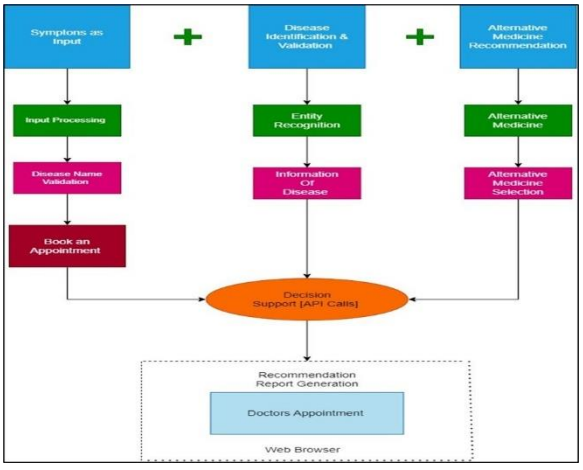

Fig 1.6 System architecture model

V. HARDWARE AND SOFTWARE REQUIREMENTS

A. HARDWARE REQUIREMENTS

i. An Updated Processor
ii. Ram: Min 4 GB
iii. Hard Disk: Min 100 GB

B. SOFTWARE REQUIREMENTS

i. Operating System: Windows family
ii. Technology: Python 3.6
iii. Front-End: HTML, CSS, and JS
iv. Back-End: MySQL database

VI. SYSTEM DESIGN

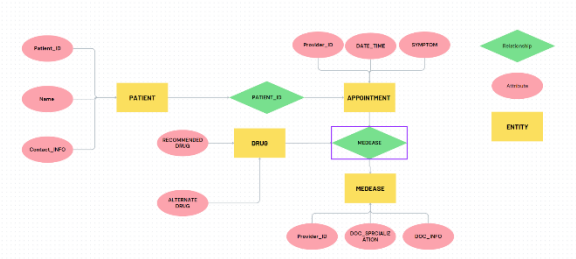

Fig 1.7 E-R Diagram

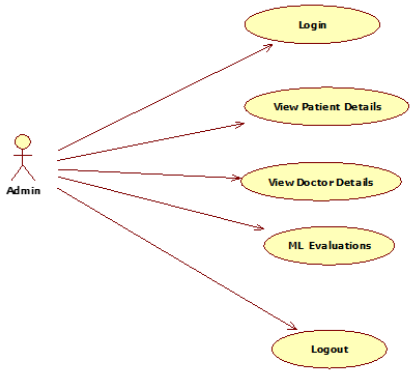

Fig 1.8 User Diagram

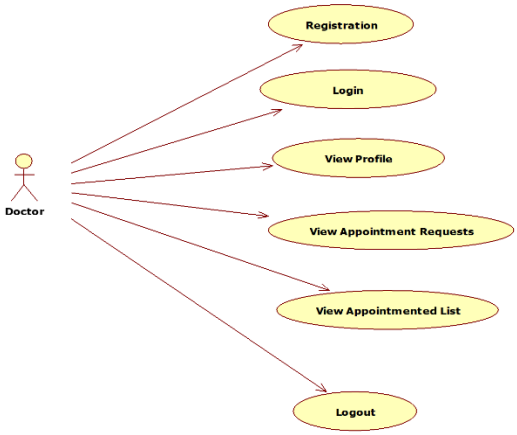

Fig 1.9 User Diagram

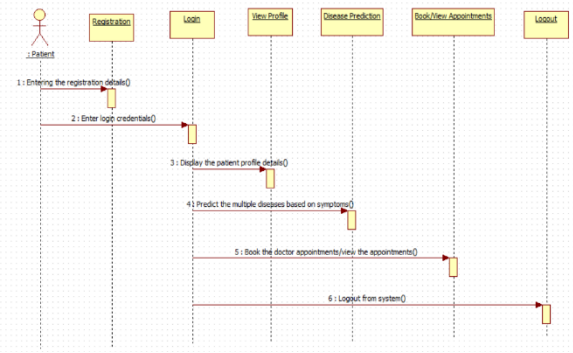

Fig 1.10 Sequence Diagram

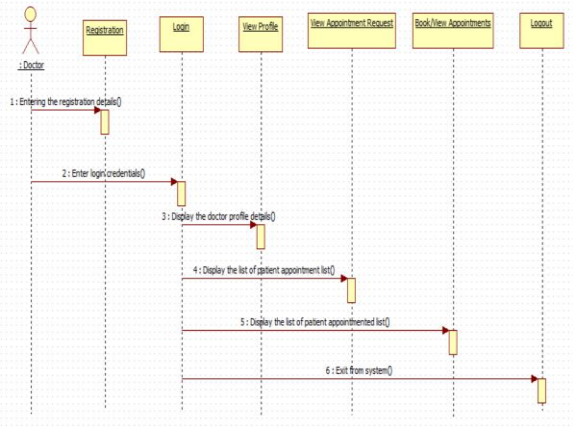

Fig 1.11 Sequence Diagram

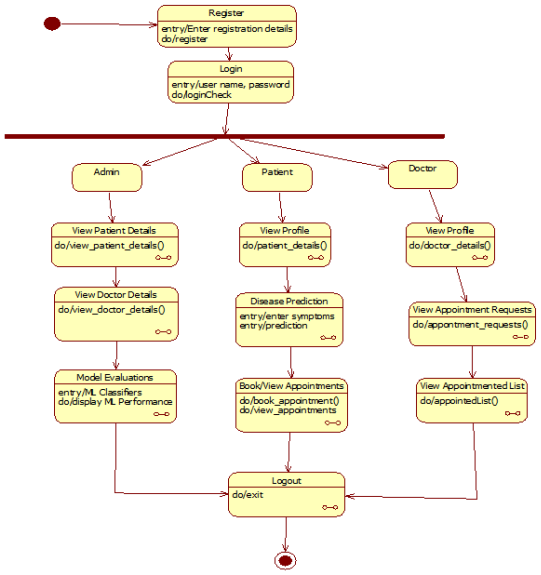

Fig 1.12 State Diagram

VII. SYSTEM IMPLEMENTATIONS

A. ALGORITHM USED IN PROPOSED SYSTEM

```
#RandomForest Classifier
rfc_clf = RandomForestClassifier(n_estimators=300,max_depth=2)
rfc_clf.fit(X_train, y_train)

predicted = rfc_clf.predict(X_test)

accuracy_rf = accuracy_score(y_test, predicted)*100

precision_rf = precision_score(y_test, predicted, average='weighted')*100
```

Fig 1.13 Random Forest

```
# NaiveBayes Classifier
nb_clf = BernoulliNB(alpha=150)

nb_clf.fit(X_train, y_train)

predicted = nb_clf.predict(X_test)

accuracy_nb = accuracy_score(y_test, predicted)*100

precision_nb = precision_score(y_test, predicted,average='weighted')*100

recall_nb = recall_score(y_test, predicted, average='weighted')*100

fscore_nb = f1_score(y_test, predicted, average='weighted')*100

print("NB=",accuracy_nb,precision_nb,recall_nb,fscore_nb)

nb_list.append("NaiveBayes")
nb_list.append(accuracy_nb)
nb_list.append(precision_nb)
nb_list.append(recall_nb)
nb_list.append(fscore_nb)
```

Fig 1.14 Naive Bayes Algorithm

```
# Decision Tree
dt_clf = DecisionTreeClassifier(criterion='entropy',max_depth=6)

dt_clf.fit(X_train, y_train)

predicted = dt_clf.predict(X_test)

accuracy_dt = accuracy_score(y_test, predicted)*100

precision_dt = precision_score(y_test, predicted, average='macro')*100

recall_dt = recall_score(y_test, predicted, average='macro')*100

fscore_dt = f1_score(y_test, predicted, average='macro')*100

print("DT=",accuracy_dt,precision_dt,recall_dt,fscore_dt)

dt_list.append("DecisionTreeClassifier")
dt_list.append(accuracy_dt)
dt_list.append(precision_dt)
dt_list.append(recall_dt)
dt_list.append(fscore_dt)
```

Fig 1.15 Decision Tree

```
#Voting Classifier
voting_clf = VotingClassifier(estimators=[('RF', rfc_clf), ('NB', nb_clf), ('dt', dt_clf)], voting='hard')

voting_clf.fit(X_train, y_train)

predicted = voting_clf.predict(X_test)

accuracy_voting = accuracy_score(y_test, predicted)*100

precision_voting = precision_score(y_test, predicted, average='macro')*100

recall_voting = recall_score(y_test, predicted, average='macro')*100

fscore_voting = f1_score(y_test, predicted, average='macro')*100

print("VC=",accuracy_voting,precision_voting,recall_voting,fscore_voting)
```

Fig 1.16 Voting Classifier Algorithm

C. DATA SET DESCRIPTION

The dataset used is Disease Prediction dataset which is derived from the Kaggle data collection. The dataset contains 4921 instances, and 133 features or characteristics are treated as disease symptoms which are shown in figure.

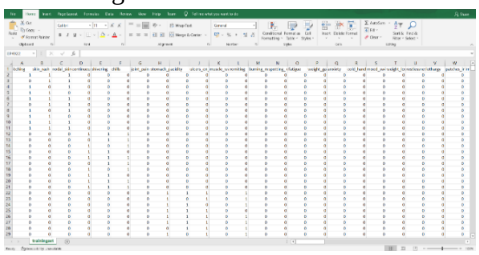

Fig 1. 17 Data set Collection

C. RESULTS WITH COMPARATIVE METHODS

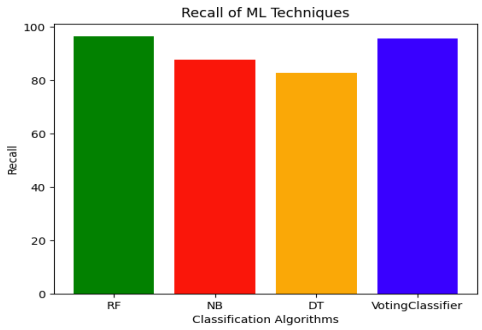

Fig 1.18 Recall with Comparative Methods

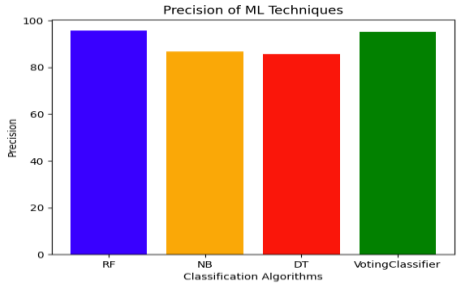

Fig 1.19 Precision with Comparative Methods

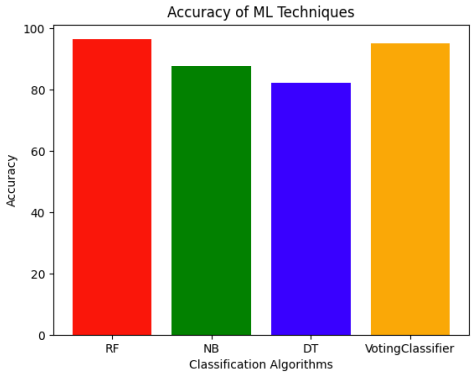

Fig 1.20 Accuracy with Comparative Methods

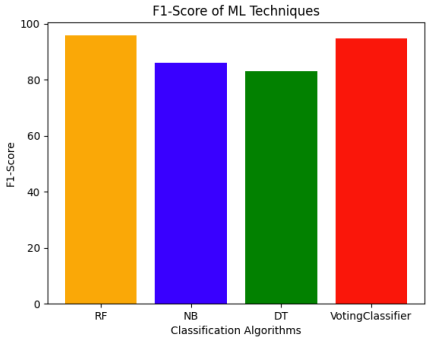

Fig 1.21 F1- Score with Comparative Methods

VIII. RESULT

A. TEST CASES

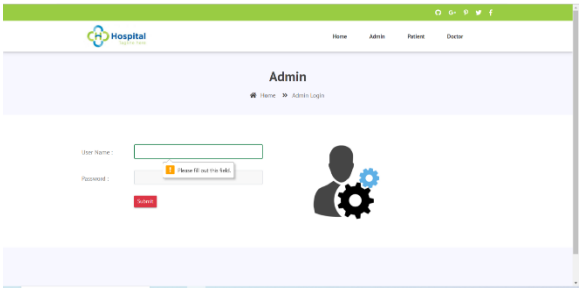

Fig 1.22Validation testing

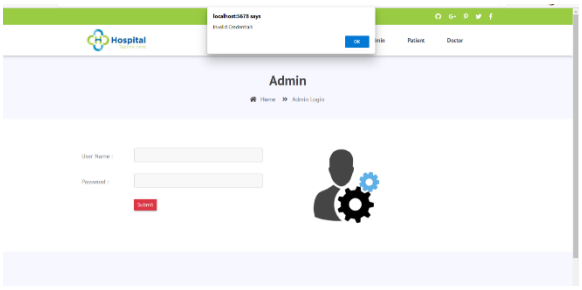

Fig 1.23 Verification Testing

B. SCREENSHOTS

Fig 1.24 Index page

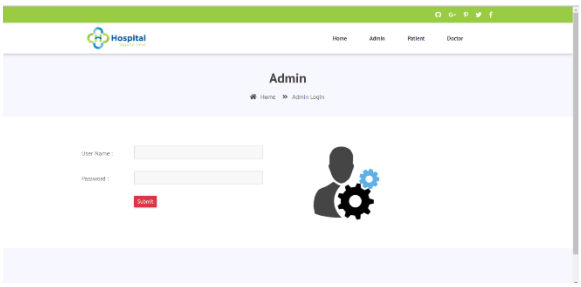

Fig 1.25 Admin Login Page

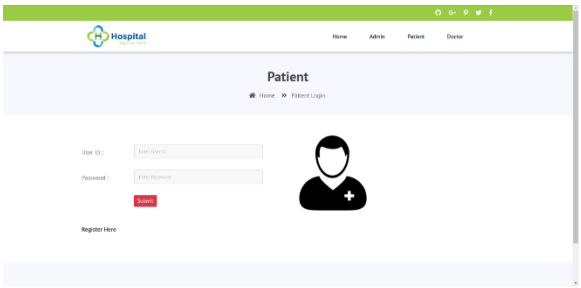

Fig 1.26 Patient's Login Page

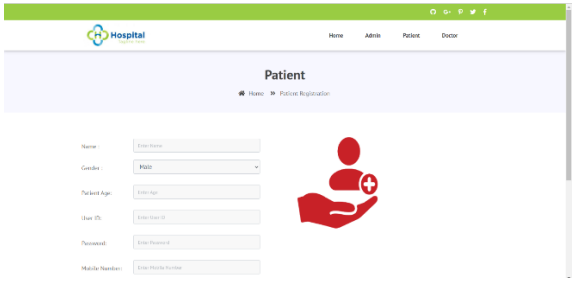

Fig 1.27 Patient's Registration Page

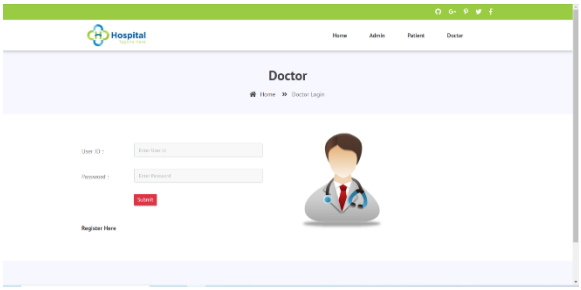

Fig 1.28 Doctor's Login Page

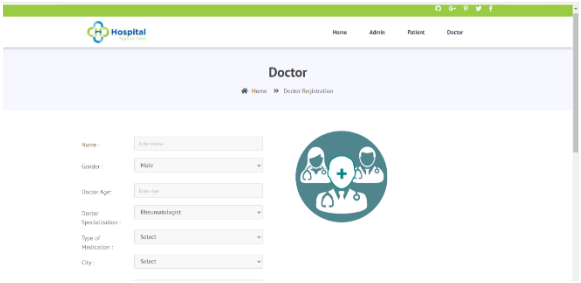

Fig 1.29 Doctor's Registration Page

Fig 1.30 Index page

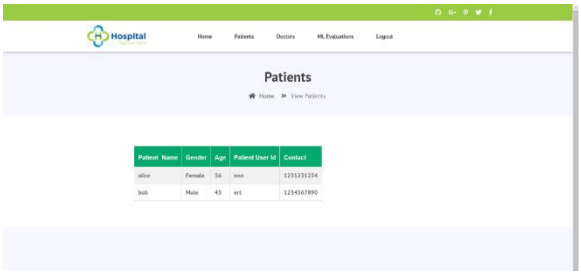

Fig 1.31 Patient details page

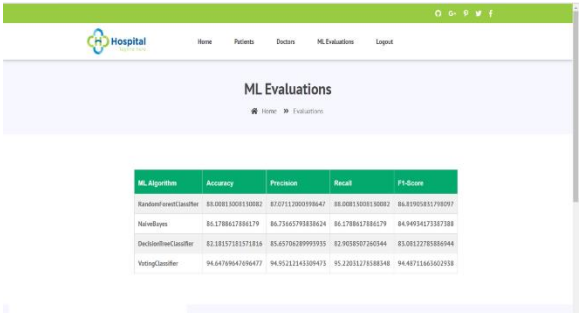

Fig 1.32 Result

CONCLUSION

In conclusion, Med Ease represents a groundbreaking advancement in healthcare technology, offering a holistic solution to streamline patient care processes. Through its innovative features such as symptom selection, disease prediction, doctor appointment booking, and comprehensive medication recommendations including alternative treatments, Med Ease aims to enhance accessibility, efficiency, and patient outcomes in the healthcare landscape.

FUTURE SCOPE

The future scope of a Med ease is vast and promising. There will be Algorithm Refinement, Expansion of Symptom and Disease Coverage, Updates to Medical Recommendation Database.Through these initiatives,

Med Ease can continue to evolve as a comprehensive and indispensable tool for empowering patients and improving healthcare delivery.

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