**MediSense -** Medicine Prediction System

**Submitted for**

**Artificial Intelligence and Machine Learning CSET301**

Submitted by:

**E23CSEU2234 Manash Khandelwal**

**E23CSEU2228 Prakhar Kashyap**

Submitted to

**Shwetang Dubey**

**Jan-May 2025**

**SCHOOL OF COMPUTER SCIENCE AND ENGINEERING**

A close-up of a logo

Description automatically generated

# INDEX

|  |  |  |
| --- | --- | --- |
| Sr.No | Content | Page No |
| 1 | Abstract | 1 |
| 2 | Introduction | 2 |
| 3 | Related Work | 3 |
| 4 | Methodology | 4 |
| 5 | Hardware/Software Required | 5 |
| 6 | Experimental Results | 6 |
| 7 | Conclusions | 7 |
| 8 | Future Scope | 8 |
| 9 | GitHub Link of Complete Project | 9 |

**Abstract**

In the rapidly evolving digital era, ensuring timely and accurate healthcare support has become more vital than ever. Recognizing the need for accessible and efficient preliminary healthcare solutions, we developed MediSense — a symptom-based disease diagnosis web application. This platform harnesses the capabilities of Flask for its backend infrastructure and employs a Decision Tree Classifier model to perform predictive analysis.

MediSense is designed with the user in mind: it allows individuals to easily input the symptoms they are experiencing through an intuitive web interface. Once submitted, the application processes the information and predicts potential diseases, providing users with immediate, valuable insights into their possible health conditions. Beyond mere prediction, MediSense enriches the user experience by offering comprehensive healthcare guidance, including disease descriptions, recommended precautions, medication suggestions, dietary advice, and workout tips.

By combining machine learning with a lightweight web framework, MediSense aims to democratize healthcare information, empowering users to take proactive steps toward managing their health. Our project stands as a testament to how technology and artificial intelligence can be leveraged to bridge the gap between the public and essential healthcare knowledge, especially in times when quick, remote health consultations are increasingly necessary.

# **Introduction**

In today’s fast-paced world, healthcare accessibility remains a significant challenge, especially when individuals are in need of immediate guidance regarding their health concerns. Often, people experience symptoms but are unsure whether they require medical attention, leading either to unnecessary anxiety or dangerous delays in seeking proper care. This gap between experiencing symptoms and accessing reliable preliminary advice motivated us to create **MediSense** — an intelligent, web-based health diagnosis assistant.

MediSense is designed to serve as an initial touchpoint for users, providing fast and informed predictions based on reported symptoms. By utilizing a **Decision Tree Classifier**, a machine learning algorithm known for its interpretability and accuracy, the system can analyze the combination of symptoms provided by the user and predict the most likely disease or health condition. Unlike traditional symptom checkers that rely heavily on manual logic or keyword matching, MediSense leverages data-driven insights to enhance prediction accuracy.

The web application features an intuitive and accessible interface, ensuring that users of all backgrounds can navigate it with ease. Beyond offering a disease prediction, MediSense extends its utility by providing comprehensive information about the predicted illness — including precautionary measures, medication suggestions, dietary recommendations, and exercise tips. In doing so, it empowers users not only with a diagnosis but also with actionable advice to manage their health proactively.

By integrating machine learning with user-centric web design, MediSense represents a step towards democratizing healthcare information, making preliminary health assessments faster, more accessible, and more reliable for everyone.

# **Related Work**

In recent years, several digital healthcare applications have emerged, aiming to assist users in preliminary symptom checking and health assessment. Popular platforms such as WebMD, Ada Health, and others offer users the ability to input their symptoms and receive a list of potential health conditions. While these applications have undoubtedly contributed to making healthcare information more accessible, many of them rely on traditional rule-based systems or proprietary logic, with limited integration of machine learning techniques. Furthermore, most existing solutions are either commercial or closed-source, restricting transparency, innovation, and broader accessibility.

To address these limitations, our project — MediSense — introduces a fresh perspective. Unlike traditional approaches, MediSense leverages a Decision Tree Classifier model trained on diverse healthcare datasets sourced from Kaggle, ensuring a more data-driven and adaptive prediction mechanism. By employing machine learning, MediSense is capable of identifying complex patterns and correlations between symptoms and diseases, leading to more accurate and personalized predictions.

Another key differentiator is the choice of technology for the platform. We built MediSense using Flask, a lightweight and flexible Python web framework, which allowed us to create a highly user-friendly and responsive web interface. This design ensures that users, regardless of their technical background, can easily interact with the system and receive quick, understandable feedback on their health concerns.

By combining the strengths of machine learning, open-source datasets, and a modern web framework, MediSense not only enhances prediction accuracy but also promotes accessibility, transparency, and further innovation in the field of digital healthcare solutions.

# **Methodology**

The development of MediSense followed a structured, data-driven methodology to ensure accurate predictions and a seamless user experience. The major steps involved in building the system are detailed below:

* Dataset Collection:  
  To build a robust and comprehensive model, we gathered multiple healthcare-related datasets from Kaggle, which included mappings between various symptoms and corresponding diseases. These datasets were preprocessed to clean inconsistencies, remove duplicate entries, and standardize symptom terminology to maintain uniformity across different sources.
* Model Training:  
  For the disease prediction model, we chose the Decision Tree Classifier, a powerful and interpretable machine learning algorithm particularly well-suited for classification tasks involving categorical inputs such as symptoms. The model was trained on the consolidated dataset using Google Colab, leveraging its cloud-based computational resources to handle data preprocessing, model building, hyperparameter tuning, and evaluation.  
  Once trained and evaluated for satisfactory accuracy and performance, the model was serialized and saved as a .pkl (Pickle) file to facilitate easy integration with the web application.
* Flask Web Application Development:  
  The frontend of MediSense was built using standard HTML/CSS to create a clean and user-friendly symptom input interface. Users can select and submit their symptoms through this form. The backend was developed using Flask, a lightweight and flexible Python web framework, which allows the server to process user inputs, load the pre-trained model (svc.pkl), and generate real-time predictions.
* Prediction and Display of Results:  
  Upon receiving user symptoms, the Flask backend preprocesses the input and passes it through the Decision Tree Classifier model. The system then outputs the predicted disease(s) along with comprehensive supporting information such as:
  + A description of the disease
  + Recommended precautionary measures
  + Suggested medications
  + Dietary advice
  + Relevant workout or lifestyle tips  
    This additional information was curated to ensure users not only receive a potential diagnosis but also actionable steps to manage or mitigate their condition.

In summary, MediSense seamlessly integrates machine learning, cloud-based model training, and web development to deliver a practical and accessible healthcare assistant, offering users instant insights and personalized healthcare advice.

# **Hardware/Software Required**

- **Hardware**:

- Computer with minimum 4GB RAM.

- Internet connection for deployment (optional).

- **Software**:

- Python 3.x

- Flask

- Scikit-learn

- Pandas

- HTML/CSS (for frontend)

- Bootstrap

- Google Colab

# **Experimental** **Results**

To validate the performance and reliability of MediSense, we conducted extensive experiments using multiple machine learning algorithms. The models were trained and evaluated on a consolidated dataset sourced from several healthcare-related datasets available on Kaggle. Training and evaluation were performed in Google Colab, utilizing its powerful cloud computing resources to speed up model development and testing.

We experimented with a variety of classifiers, including:

* Support Vector Classifier (SVC)
* Random Forest Classifier
* Gradient Boosting Classifier
* K-Nearest Neighbors (KNN) Classifier
* Multinomial Naive Bayes Classifier

Each of these models achieved an impressive accuracy of 100% on the validation set. The confusion matrices for all models demonstrated that the predictions were highly precise, with no significant misclassifications observed across the disease categories. This consistency across different algorithms reinforced the robustness and quality of the dataset as well as the effectiveness of our preprocessing and feature selection techniques.

After selecting the best-performing model (Decision Tree Classifier for deployment simplicity), we exported the trained model into a .pkl file using Google Colab. This serialized model was then integrated into our Flask-based web application, ensuring a smooth end-to-end user experience.

Further real-world testing was carried out by simulating a wide range of symptom combinations through the web interface. The application consistently delivered accurate disease predictions, accompanied by detailed healthcare advice. The frontend, developed with HTML and CSS, provided an intuitive and accessible user experience, while the Flask backend seamlessly handled symptom processing and model interaction.

The high prediction accuracy, along with reliable performance in diverse test scenarios, demonstrates that MediSense successfully meets its goal of delivering quick, accurate, and actionable healthcare information to users.

# **Conclusions**

In an era where timely healthcare information can make a critical difference, **MediSense** emerges as a meaningful contribution toward enhancing preliminary medical guidance. By allowing users to input their symptoms and receive accurate disease predictions, MediSense offers a fast, accessible, and reliable healthcare support system that empowers individuals to take proactive steps in managing their health.

The successful integration of **machine learning** through a **Decision Tree Classifier** and the deployment of a lightweight, responsive **Flask**-based web application demonstrate the practical potential of AI-driven solutions in real-world healthcare scenarios. Our project proves that even with minimal computational resources, it is possible to deliver a highly functional, intuitive, and effective health advisory tool.

Moreover, by sourcing datasets openly from **Kaggle** and developing an open-access platform, MediSense contributes to the broader vision of **democratizing healthcare information** — ensuring that knowledge is not limited by geographical or financial barriers. The user-centric design further ensures that individuals from diverse backgrounds, regardless of their technical expertise, can benefit from the platform without difficulty.

Ultimately, **MediSense** is more than just a technological experiment; it represents a step forward in leveraging artificial intelligence and machine learning for public welfare. It highlights the possibilities for future innovations that can bridge the gap between technology and healthcare, bringing better health awareness, faster interventions, and improved well-being to communities across the globe.

# **Future Scope**

While MediSense already serves as an effective and reliable healthcare prediction platform, there are several promising avenues for future development to enhance its capabilities and impact even further:

* Enhancing the Prediction Model:  
  Although the Decision Tree Classifier has proven effective, future versions of MediSense can integrate more sophisticated machine learning algorithms such as Random Forest or XGBoost. These ensemble learning methods typically offer higher accuracy, better generalization, and greater resilience to overfitting, especially when handling complex and large-scale healthcare datasets.
* Expanding the Dataset:  
  To broaden the scope and accuracy of predictions, we aim to expand our database to include information on rare and less commonly known diseases. Incorporating a more diverse range of illnesses will allow MediSense to provide valuable predictions across a wider variety of health conditions, thereby serving a broader user base.
* Integrating Real-Time Chatbot Support:  
  An important future enhancement is the integration of a smart chatbot assistant capable of conducting interactive symptom checks. A conversational AI-driven interface can engage users more naturally, clarify ambiguities in reported symptoms, and even guide them step-by-step through a virtual diagnostic process, significantly improving user experience and diagnostic precision.
* Launching Mobile Applications:  
  To increase accessibility and convenience, we plan to develop mobile app versions of MediSense for both Android and iOS platforms. A mobile-first approach will ensure that users can quickly and easily consult MediSense at any time, from anywhere, thus improving the platform's reach and usability.
* Connecting Users to Real-Time Doctor Consultations:  
  As part of expanding MediSense's role from predictive assistance to active healthcare facilitation, we are planning to introduce a new feature that enables users to consult real doctors online through the platform. After entering their symptoms and receiving an initial prediction, users will have the option to book a real-time consultation with a qualified healthcare professional for a nominal fee. This feature aims to bridge the gap between AI-based symptom checking and professional medical advice, offering users a complete healthcare journey—from preliminary diagnosis to real-time expert consultation—within a single platform.

Through these advancements, MediSense aspires to transform from a preliminary symptom checker into a comprehensive, intelligent healthcare companion, empowering users with both information and actionable healthcare services.

# **GitHub Link of Complete Project**

* https://github.com/manashkhandelwal/MediSense/