HEALTH CARE CENTER

WEB APP USING MACHINE LEARNING

A Project Report Submitted

In Partial Fulfilment of the Requirements

for the Degree of

BACHELOR OF TECHNOLOGY

In

Computer Science and Engineering

By

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To The

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DECLARATION

I declare that the project entitled HEALTH CARE CENTER is the result of my own work. All sources of information used in this project have been duly acknowledged and referenced.

I affirm that this project has not been submitted in any form for any other degree or diploma at any university or institution. The work presented in this project is original, except where references are made to the work of others. Any contribution from collaborators or sources external to this project has been duly acknowledged.

I take full responsibility for the authenticity and accuracy of the content presented in this project, including any data analysis, interpretations, conclusions, and recommendations.

Furthermore, I acknowledge that any software code, algorithms, or methodologies developed as part of this project are the original work of myself and/or my collaborators, and appropriate credit has been given to existing frameworks, libraries, or tools used.

I understand the importance of academic integrity and ethics and affirm that this project has been conducted in accordance with the guidelines and regulations set forth by the academic institution.

Signed: Purnchandra Pandey

Date:

CERTIFICATE

Certified that **Purnchandra Pandey** (enrollment no. **200384010046508)** has successfully completed the final year project entitled "**HEALTH CARE CENTER**" as part of requirement for the Bachelor of Technology from Dr. APJ Abdul Kalam Technical University, Lucknow under my supervision.

The project involved the design, development, and implementation of a comprehensive Health Care Center aimed at revolutionizing healthcare management through personalized medication recommendations. By leveraging advanced technologies such as data analytics and machine learning, I have demonstrated a deep understanding of healthcare systems and their potential for improvement through innovation.

Throughout the project, I have exhibited exemplary dedication, creativity, and technical proficiency, resulting in the successful completion of a project that holds significant promise for improving patient outcomes and optimizing healthcare resource utilization.

Signature: Purnchandra Pandey

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ABSTRACT

This project proposes the development of an advanced Health Care Center or Medicine Recommended System aimed at enhancing healthcare management through personalized medication recommendations. Traditional healthcare systems often lack the sophistication to provide tailored treatment plans, leading to suboptimal outcomes and inefficiencies.

Leveraging cutting-edge technologies such as data analytics and machine learning, our system seeks to revolutionize the healthcare landscape by offering personalized medication recommendations based on individual patient profiles, medical histories, and treatment efficacy. By integrating patient data with advanced algorithms, the system will provide healthcare professionals with invaluable insights to optimize treatment plans and improve patient outcomes. Through rigorous testing and validation procedures, we aim to demonstrate the effectiveness and reliability of our system in improving healthcare management and enhancing patient care. This project signifies a significant step towards harnessing the power of technology to address the challenges faced by the healthcare industry, ultimately contributing to the advancement of global health outcomes.

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HEALTH CARE CENTER

CHAPTER 1

INTRODUCTION

Healthcare is a fundamental aspect of societal well-being, and with the advancements in technology, the integration of recommendation systems into healthcare centers has become increasingly prevalent. This project aims to delve into the development and implementation of a recommendation system tailored specifically for healthcare centers or medical facilities. By leveraging data analytics and machine learning algorithms, this system seeks to enhance patient care, streamline processes, and improve overall efficiency within healthcare settings.

1.1 Overview of the Project

The project entails the creation of a robust recommendation system designed to assist healthcare professionals in making informed decisions regarding patient treatment, medication prescriptions, and resource allocation. This system will utilize patient data, medical records, and other relevant information to generate personalized recommendations tailored to individual needs and medical histories.

1.2 Background Information

Healthcare systems worldwide are facing numerous challenges, including rising costs, increasing patient volumes, and the need for improved quality of care. Recommendation systems have emerged as a promising solution to address these challenges by offering insights and suggestions based on data analysis and predictive modeling.

In the context of healthcare, recommendation systems can be applied in various areas such as:

- **Treatment Recommendations:** Providing healthcare professionals with personalized treatment plans based on patient data, medical history, and best practices.

- **Medication Prescriptions:** Assisting physicians in selecting the most appropriate medications for patients based on factors such as medical conditions, allergies, and drug interactions.
- **Resource Allocation:** Optimizing the allocation of resources such as hospital beds, medical equipment, and staff to maximize efficiency and patient outcomes.
- **Disease Prevention and Management:** Offering recommendations for preventive measures, lifestyle modifications, and disease management strategies based on individual risk factors and medical profiles.

1.3 Objectives of the Project

The primary objectives of this project include:

- **Development of a Recommendation System:** Designing and implementing a recommendation system capable of analyzing healthcare data and generating relevant recommendations for healthcare professionals.
- **Integration with Healthcare Systems:** Ensuring seamless integration of the recommendation system with existing healthcare IT infrastructure and electronic health record (EHR) systems.
- **Personalization and Customization:** Incorporating machine learning algorithms to tailor recommendations to the specific needs and preferences of individual patients and healthcare providers.
- **Evaluation and Validation:** Conducting rigorous testing and validation to assess the accuracy, effectiveness, and usability of the recommendation system in real-world healthcare settings.

1.4 Scope and Limitations

While the project aims to address several critical aspects of healthcare recommendation systems, it is essential to acknowledge certain limitations and constraints:

- **Data Privacy and Security:** Adhering to strict privacy regulations such as HIPAA (Health Insurance Portability and Accountability Act) to safeguard patient confidentiality and prevent unauthorized access to sensitive medical information.
- **Data Quality and Availability:** The effectiveness of the recommendation system relies heavily on the quality and availability of healthcare data, including patient records, diagnostic reports, and treatment histories.
- **Algorithmic Bias and Fairness:** Mitigating potential biases in the recommendation algorithms to ensure fairness and equity in treatment recommendations across diverse patient populations.
- **User Acceptance and Adoption:** Addressing concerns related to user acceptance and adoption among healthcare professionals, including training, support, and workflow integration.

In summary, this project endeavors to develop a comprehensive recommendation system for healthcare centers or medical facilities, with a focus on improving patient care, optimizing resource utilization, and enhancing overall efficiency within the healthcare ecosystem. By leveraging data analytics and machine learning techniques, this system has the potential to revolutionize the way healthcare is delivered and managed, ultimately leading to better health outcomes for patients worldwide.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview of Health Care Center

- **Importance:**
  Health care centers serve as pivotal institutions in communities, offering a wide range of medical services to individuals of all ages and backgrounds. These centers act as primary points of contact for preventive care, diagnosis, treatment, and ongoing management of various health conditions.
- **Role in Public Health**
  Health care centers play a crucial role in promoting public health initiatives such as vaccinations, disease screenings, and health education programs. They serve as platforms for disseminating vital information about healthy lifestyle choices, disease prevention, and early intervention.
- **Multidisciplinary Approach**
  Modern health care centers adopt a multidisciplinary approach, integrating medical professionals from diverse specialties such as general medicine, pediatrics, gynecology, psychiatry, and more. This approach ensures comprehensive care tailored to the individual needs of patients.

2.2 Evolution of Health Care Center

- **Historical Development:**
  The concept of health care centers has evolved significantly over time, tracing its roots back to ancient civilizations where healing temples and medical practitioners provided rudimentary medical care. Over centuries, the establishment of hospitals, clinics, and specialized medical facilities marked key milestones in the evolution of health care centers.
- **Technological Advancements**
  Advancements in medical technology have revolutionized the capabilities of health care centers. From the invention of medical instruments and diagnostic tools to the

implementation of electronic health records (EHRs) and telemedicine, technology has enhanced the efficiency, accuracy, and accessibility of health care services.

- **Shift Towards Preventive Care:**
  In recent decades, there has been a paradigm shift towards preventive care within health care centers. Emphasizing early detection, lifestyle modifications, and health promotion, this approach aims to reduce the burden of chronic diseases and improve overall population health outcomes.

2.3 Existing Technologies and Solutions

- **Electronic Health Records (EHRs)**
  EHR systems digitize patient health records, facilitating seamless information exchange among health care providers and improving coordination of care. These systems enhance efficiency, accuracy, and accessibility of patient data, leading to better clinical decision-making and patient outcomes.
- **Telemedicine:**
  Telemedicine enables remote delivery of health care services via telecommunications technology, allowing patients to consult with health care providers from the comfort of their homes. This technology has gained prominence, especially during the COVID-19 pandemic, for its ability to ensure continuity of care while minimizing exposure risks.
- **Artificial Intelligence (AI) in Diagnostics:**
  AI-powered diagnostic tools leverage machine learning algorithms to analyze medical imaging scans, pathology samples, and other diagnostic data. These tools enhance diagnostic accuracy, reduce turnaround times, and assist clinicians in making informed decisions regarding patient management.
- **Wearable Health Technologies:**
  Wearable devices such as fitness trackers, smartwatches, and biosensors monitor various health parameters in real-time, empowering individuals to take proactive steps towards improving their health. Integration of wearable health technologies with health care center systems enables continuous monitoring and early detection of health issues.

2.4 Challenges and Limitations

- **Interoperability Issues:**
  One of the primary challenges faced by health care centers is the lack of interoperability among different health information systems. Incompatibility between EHR systems, medical devices, and telemedicine platforms hinders seamless data exchange and care coordination, leading to fragmented care delivery.
- **Privacy and Security Concerns**
  The digitization of health records raises concerns about the privacy and security of sensitive patient information. Health care centers must implement robust cybersecurity measures to safeguard against data breaches, unauthorized access, and identity theft, ensuring compliance with regulatory standards such as HIPAA.
- **Digital Divide:**
  Disparities in access to technology and digital literacy contribute to the digital divide, posing barriers to equitable health care delivery. Vulnerable populations, including low-income individuals, elderly adults, and rural communities, may face challenges accessing and utilizing digital health technologies, exacerbating health inequalities.
- **Clinical Integration Challenges:**
  Integrating new technologies into existing clinical workflows presents challenges related to staff training, workflow redesign, and change management. Health care centers must invest in ongoing training and support to ensure successful adoption and integration of technology into routine clinical practice.

In conclusion, health care centers serve as essential hubs for delivering comprehensive medical care to individuals and communities. The evolution of these centers has been shaped by technological advancements, shifting paradigms in care delivery, and emerging challenges. By leveraging existing technologies and addressing ongoing limitations, health care centers can continue to evolve and adapt to meet the evolving needs of patients and improve population health outcomes.

CHAPTER 3

METHODOLOGY

In the pursuit of creating a comprehensive and effective recommendation system for a Health Care Center or Medicine, our methodology encompasses various stages that ensure accuracy, reliability, and user-friendliness. From data collection to integration and testing, each step is crucial in crafting a system that meets the needs of both healthcare providers and patients.

3.1 Data Collection

Data collection forms the foundation of our recommendation system, as it drives the accuracy and relevance of the suggestions provided. We adopt a multifaceted approach to gather diverse datasets that encompass patient records, medical histories, treatment outcomes, and medication effectiveness.

- **Electronic Health Records (EHR):** Leveraging EHR systems, we accumulate structured data including patient demographics, diagnoses, medications, laboratory results, and vital signs. These records offer a comprehensive view of each patient's medical journey, aiding in personalized recommendations.
- **Medical Literature and Research:** We delve into a vast array of medical literature and research studies to extract insights into treatment efficacy, medication interactions, and best practices. This ensures that our recommendations are not only data-driven but also aligned with the latest medical advancements.
- **Patient Feedback and Surveys:** Understanding patient preferences, experiences, and satisfaction levels is paramount. Through feedback mechanisms and surveys, we capture subjective information such as treatment tolerances, side effects, and lifestyle considerations, enriching our recommendation algorithms with qualitative insights.
- **Collaboration with Healthcare Providers:** Collaborating closely with healthcare providers grants us access to expert knowledge and clinical expertise. By incorporating inputs from physicians, pharmacists, and other healthcare professionals, we ensure that our recommendations are clinically sound and align with established protocols.

3.2 System Architecture

The system architecture defines the framework within which our recommendation engine operates, orchestrating the flow of data and interactions between various components. Our architecture is designed for scalability, flexibility, and interoperability, accommodating future enhancements and integration with existing healthcare infrastructure.

Microservices Architecture: Embracing a microservices architecture allows for modular development and deployment of individual components, fostering agility and ease of

maintenance. Each microservice encapsulates specific functionalities such as data ingestion, recommendation generation, and user interface interaction, facilitating independent scaling and updates.

- **Cloud-Based Infrastructure:** Leveraging cloud computing infrastructure provides scalability, reliability, and accessibility. By hosting our system on cloud platforms, we ensure seamless availability across geographies, with elastic resource allocation to handle varying loads and demands.
- **Data Processing Pipelines:** Implementing robust data processing pipelines enables efficient ingestion, cleansing, and transformation of diverse datasets. Leveraging technologies such as Apache Spark or Apache Flink, we preprocess raw data, perform feature engineering, and derive actionable insights to feed into our recommendation algorithms.
- **API-driven Integration:** Adopting an API-driven approach facilitates seamless integration with external systems, such as electronic medical record (EMR) systems, pharmacy management systems, and telehealth platforms. Standardized APIs enable bidirectional communication, allowing our recommendation engine to consume relevant data and deliver recommendations within existing workflows.

3.3 Algorithm Development

Algorithm development lies at the heart of our recommendation system, driving the generation of personalized suggestions tailored to each patient's unique profile and medical history. We employ a blend of machine learning, natural language processing, and decision support techniques to analyze vast datasets and derive actionable insights.

- **Collaborative Filtering:** Utilizing collaborative filtering techniques, we identify patterns and similarities among patients to recommend treatments or medications based on the experiences of similar individuals. By leveraging user-item interactions and user-user similarities, we generate personalized recommendations that resonate with each patient's preferences and medical history.
- **Content-based Filtering:** Content-based filtering leverages the attributes of treatments, medications, and medical conditions to generate recommendations that align with the user's profile. By analyzing features such as drug efficacy, side effects, contraindications, and patient demographics, we tailor recommendations to match the specific needs and characteristics of each patient.
- **Hybrid Recommender Systems:** Combining collaborative filtering and content-based filtering techniques, we develop hybrid recommender systems that harness the strengths of both approaches. By integrating user preferences, item attributes, and contextual information, we provide more accurate and diverse recommendations that cater to a broader spectrum of patient needs.
- **Reinforcement Learning:** Employing reinforcement learning algorithms, we continuously refine our recommendation strategies based on user feedback and outcomes. By rewarding actions that lead to positive patient outcomes and penalizing those that result in adverse effects, we iteratively improve the efficacy and relevance of our recommendations over time.

3.4 User Interface Design

The user interface serves as the primary point of interaction between users and our recommendation system, shaping the user experience and facilitating seamless navigation and decision-making. Our user interface design prioritizes simplicity, intuitiveness, and accessibility, ensuring that users can easily comprehend recommendations and take informed actions.

- **Personalized Dashboards:** Tailoring dashboards to each user's role and preferences enhances usability and relevance. Healthcare providers are presented with summary views of patient profiles, treatment histories, and recommended interventions, while patients receive intuitive interfaces for exploring treatment options, scheduling appointments, and tracking progress.
- **Interactive Visualization:** Incorporating interactive visualization components, such as charts, graphs, and heatmaps, enhances data comprehension and decision-making. Patients can explore treatment pathways, medication regimens, and potential outcomes through intuitive visual representations, empowering them to make informed choices about their healthcare journey.
- **Responsive Design:** Designing our user interface with responsiveness in mind ensures optimal user experiences across devices and screen sizes. Whether accessed from desktops, tablets, or smartphones, our interface adapts seamlessly to accommodate varying resolutions and form factors, enabling users to engage with the system anytime, anywhere.
- **Feedback Mechanisms:** Integrating feedback mechanisms within the user interface solicits user input and fosters continuous improvement. Patients can provide ratings, reviews, and testimonials about their treatment experiences, while healthcare providers can offer insights and suggestions for enhancing the system's functionality and usability.

3.5 Integration and Testing

Integration and testing are pivotal phases in the development lifecycle, ensuring that our recommendation system operates seamlessly within the broader healthcare ecosystem and delivers reliable, accurate, and safe recommendations to users.

- **End-to-End Integration:** Integrating our recommendation system with existing healthcare infrastructure, such as electronic health record systems, pharmacy management systems, and telemedicine platforms, ensures interoperability and data exchange. Seamless integration enables healthcare providers to access recommendations within their familiar workflows, streamlining decision-making and care delivery.
- **Functional Testing:** Conducting rigorous functional testing validates the correctness and completeness of our recommendation algorithms and user interface components. We simulate diverse usage scenarios, edge cases, and input combinations to assess system behavior under varying conditions, ensuring robustness and reliability in real-world deployments.

- **Performance Testing:** Evaluating system performance under load and scalability testing assesses its responsiveness, throughput, and resource utilization. By subjecting our recommendation engine to simulated concurrent user interactions and data processing workloads, we identify bottlenecks, optimize resource allocation, and ensure optimal performance under peak loads.

- **User Acceptance Testing:** Engaging end-users in user acceptance testing solicits feedback on usability, intuitiveness, and satisfaction with the recommendation system. Iteratively incorporating user feedback and addressing usability concerns enhances user adoption and satisfaction, driving the success of our recommendation system in improving patient outcomes and healthcare delivery.

In conclusion, our methodology encompasses a holistic approach to designing and implementing a recommendation system for healthcare centers or medicine. By leveraging diverse data sources, advanced algorithms, intuitive user interfaces, and rigorous testing methodologies, we aim to empower healthcare providers and patients with personalized recommendations that enhance clinical decision-making, improve treatment outcomes, and ultimately,

CHAPTER 4

SYSTEM DESIGN

In the realm of healthcare, the design of a recommended system for a Health Care Center or Medicine plays a crucial role in ensuring efficiency, accuracy, and security. This segment will delve into the intricate details of system design, encompassing its components, database structure, security measures, and user roles and permissions.

4.1 System Components and Modules

The system components and modules of a recommended health care center or medicine system are fundamental in its functionality and usability. Here's a breakdown of the essential elements:

- **User Interface:** The user interface serves as the gateway for interaction between users and the system. It should be intuitive, user-friendly, and accessible across various devices such as desktops, tablets, and mobile phones. The interface design should prioritize simplicity without compromising on functionality, ensuring that users can navigate through the system seamlessly.
- **Patient Management Module:** This module is at the core of the system, facilitating the management of patient records, appointments, medical history, prescriptions, and treatment plans. It should allow healthcare providers to efficiently track patient progress, schedule appointments, and communicate with patients seamlessly.
- **Inventory Management Module:** The inventory management module is responsible for tracking and managing medical supplies, equipment, and pharmaceuticals within the healthcare center. It should enable inventory tracking, automated reordering of supplies, expiration date monitoring, and inventory optimization to ensure adequate stock levels at all times.

- **Appointment Scheduling Module:** Efficient appointment scheduling is vital for optimizing resource utilization and minimizing patient wait times. This module should allow patients to schedule appointments online, view available time slots, receive appointment reminders, and facilitate seamless communication between patients and healthcare providers.
- **Billing and Payment Module:** The billing and payment module streamlines the financial aspect of healthcare services, including invoicing, insurance claims processing, payment processing, and revenue management. It should integrate seamlessly with other modules to generate accurate invoices based on services rendered and insurance coverage, facilitating smooth financial transactions.
- **Reporting and Analytics Module:** Data-driven insights are invaluable for optimizing healthcare operations and improving patient outcomes. The reporting and analytics module should provide comprehensive reports and analytics on key performance indicators, patient demographics, treatment outcomes, and financial metrics. It should support customizable reporting templates and visualization tools to facilitate data interpretation and decision-making.

4.2 Database Design

A well-designed database is the backbone of any healthcare information system, providing a secure and efficient platform for storing, retrieving, and managing data. Here's an overview of the database design considerations:

- **Data Model:** The data model defines the structure and relationships of the database entities, such as patients, healthcare providers, appointments, prescriptions, and medical records. It should adhere to industry standards and best practices for data normalization, ensuring data integrity and minimizing redundanc.
- **Database Schema:** The database schema outlines the organization of tables, columns, and constraints within the database. It should be optimized for efficient data retrieval and manipulation, with proper indexing and partitioning strategies to enhance performance.

- **Data Security:** Data security is paramount in healthcare systems to protect sensitive patient information from unauthorized access, tampering, or disclosure. The database should implement robust encryption algorithms, access controls, audit trails, and data masking techniques to safeguard patient confidentiality and comply with regulatory requirements such as HIPAA.
- **Scalability and Performance:** As the volume of healthcare data continues to grow, scalability and performance are essential considerations in database design. The database should be capable of handling increasing data loads and concurrent user sessions without compromising on responsiveness or throughput. Scalability features such as sharding, replication, and caching should be incorporated to support future expansion and ensure optimal performance.

4.3 Security and Privacy Measures

Ensuring the security and privacy of patient information is paramount in healthcare systems to maintain trust and compliance with regulatory requirements. Here are the key security and privacy measures to be implemented:

- **Access Control:** Access control mechanisms should be implemented to restrict access to sensitive patient information based on user roles and permissions. Role-based access control (RBAC) can be employed to define access levels for different user roles, ensuring that only authorized personnel can view or modify patient data.
- **Encryption:** Data encryption techniques should be utilized to protect data both at rest and in transit. Strong encryption algorithms should be employed to encrypt sensitive data such as patient health records, prescriptions, and payment information, preventing unauthorized access or interception by malicious actors.
- **Authentication:** Robust authentication mechanisms, such as multi-factor authentication (MFA) and biometric authentication, should be implemented to verify the identity of users accessing the system. This helps prevent unauthorized access through stolen credentials and enhances the overall security posture of the system.

- **Audit Trails:** Audit trails should be maintained to record all user activities within the system, including logins, data access, modifications, and deletions. This enables administrators to track and review user actions, detect unauthorized activities, and ensure accountability among system users.
- **Data Masking:** Data masking techniques can be employed to anonymize sensitive patient information in non-production environments, reducing the risk of data exposure during development, testing, and training activities. This involves replacing sensitive data elements with randomized or obfuscated values while preserving data integrity and usability for authorized users.

4.4 User Roles and Permissions

Effective management of user roles and permissions is essential for maintaining data security, privacy, and operational efficiency within the healthcare system. Here's how user roles and permissions should be structured:

- **Administrator:** Administrators have full access to all system functionalities and data, including user management, configuration settings, and system maintenance tasks. They are responsible for overseeing the overall operation of the system, ensuring compliance with regulatory requirements, and resolving any technical issues that may arise.
- **Healthcare Provider:** Healthcare providers, such as doctors, nurses, and allied health professionals, have access to patient records, treatment plans, and clinical documentation relevant to their role. They can create and update patient records, prescribe medications, schedule appointments, and communicate with patients within the system.
- **Front Desk Staff:** Front desk staff are responsible for managing patient appointments, check-ins, and inquiries. They have access to appointment scheduling functionalities, patient registration forms, and basic patient demographic information. They may also assist with billing inquiries and insurance verification processes.

- **Patient:** Patients have limited access to the system, primarily for scheduling appointments, viewing their medical records, and communicating with healthcare providers. They can update personal information, view lab results, and request prescription refills through the patient portal.

By meticulously designing and implementing these system components, database structures, security measures, and user roles and permissions, the recommended health care center or medicine system can effectively streamline operations, enhance patient care, and ensure compliance with regulatory standards.

CHAPTER 5

IMPLEMENTATION

In the implementation phase of the final year project, the focus is on putting the theoretical concepts into practice. This involves utilizing various technologies, following a structured development process, and addressing any challenges that arise during the implementation stage.

5.1 Technologies Used

In developing the Health Care Center/Medicine Recommended System, a range of technologies is employed to ensure efficiency, reliability, and scalability.

- **Programming Languages and Frameworks:** Python is chosen as the primary programming language due to its versatility, extensive libraries, and ease of integration with other technologies. Flask, a lightweight web framework, is utilized for building the backend infrastructure, providing RESTful APIs for communication between different system components. Additionally, JavaScript and HTML/CSS are employed for frontend development, ensuring a seamless user experience.
- **Database Management:** For data storage and management, a relational database management system (RDBMS) such as PostgreSQL or MySQL is utilized. These databases offer robustness, scalability, and support for complex queries, essential for handling the diverse data sets involved in healthcare systems.
- **Machine Learning and AI:** Machine learning algorithms play a crucial role in the recommendation system for medicines. Libraries such as TensorFlow or PyTorch are employed for developing and training machine learning models, while scikit-learn is utilized for data preprocessing, feature extraction, and model evaluation. Natural Language Processing (NLP) techniques may also be employed for analyzing textual data, such as patient symptoms and medical records.
- **Cloud Services:** Cloud computing platforms, such as Amazon Web Services (AWS) or Microsoft Azure, are leveraged for hosting the application and ensuring scalability,

reliability, and security. Services like AWS Lambda for serverless computing and AWS S3 for storage may be utilized to optimize resource utilization and minimize operational costs.

5.2 Development Process

A structured development process is essential for ensuring the successful completion of the project within the stipulated timeframe and meeting the specified requirements.

- **Requirement Analysis:** The development process begins with a thorough analysis of the project requirements, including functional and non-functional aspects. This involves discussions with stakeholders, such as healthcare professionals and system users, to understand their needs and expectations accurately.
- **Design Phase:** Based on the gathered requirements, the system architecture and design are conceptualized. This includes defining the overall system structure, database schema, user interface layout, and interaction flow. Design principles such as modularity, scalability, and usability are prioritized to ensure a robust and user-friendly system.
- **Agile Development Methodology:** An agile development methodology, such as Scrum or Kanban, is adopted to facilitate iterative development and incremental delivery. This allows for continuous feedback and adaptation, ensuring that the evolving project aligns with stakeholders' expectations and adapts to changing requirements.
- **Prototyping and Testing:** Prototypes are developed early in the development process to validate design concepts and gather user feedback. This iterative approach helps identify potential issues and refine the system's functionality and user experience. Comprehensive testing, including unit tests, integration tests, and user acceptance tests, is conducted throughout the development lifecycle to ensure software quality and reliability.
- **Continuous Integration and Deployment:** Continuous integration (CI) and deployment (CD) practices are implemented to automate the build, testing, and deployment processes. This ensures that code changes are regularly integrated into the main codebase and deployed to production environments efficiently and reliably.

5.3 Challenges Faced and Solutions

Despite careful planning and execution, various challenges may arise during the implementation phase. Addressing these challenges effectively is crucial to ensuring the project's success.

- **Data Privacy and Security:** One of the primary challenges in healthcare systems is ensuring the privacy and security of sensitive patient data. To address this challenge, robust encryption techniques, access controls, and compliance with data protection regulations such as HIPAA are implemented. Regular security audits and vulnerability assessments are conducted to identify and mitigate potential security risks.
- **Integration of Legacy Systems:** Integrating the new system with existing legacy systems poses challenges due to differences in data formats, protocols, and compatibility issues. To overcome this challenge, standardized interfaces such as APIs and middleware are developed to facilitate seamless communication between the new and legacy systems. Legacy data migration strategies are also employed to ensure data consistency and integrity across the integrated systems.
- **Scalability and Performance:** As the system usage grows, ensuring scalability and performance becomes critical to maintaining a responsive and reliable user experience. Horizontal and vertical scaling techniques, such as load balancing and auto-scaling, are implemented to handle increasing user loads and resource demands. Performance monitoring and optimization strategies are employed to identify and address performance bottlenecks proactively.
- **User Adoption and Training:** User adoption and training are essential for the successful implementation and acceptance of the new system by healthcare professionals and end-users. Comprehensive training programs, user documentation, and interactive tutorials are developed to familiarize users with the system's features and functionalities. Continuous user support and feedback mechanisms are established to address any usability issues and enhance user satisfaction.
- **Regulatory Compliance:** Compliance with regulatory requirements, such as healthcare standards and data privacy regulations, poses challenges during system implementation. To ensure regulatory compliance, close collaboration with legal and compliance teams is maintained throughout the development process. Regular audits

and assessments are conducted to verify adherence to applicable regulations and standards, mitigating the risk of non-compliance and associated penalties.

In conclusion, the successful implementation of the Health Care Center/Medicine Recommended System involves leveraging appropriate technologies, following a structured development process, and addressing various challenges effectively. By adopting best practices and innovative solutions, the project aims to deliver a reliable, scalable, and user-friendly system that enhances healthcare delivery and improves patients problems.

CHAPTER 6

RESULTS AND EVALUATION

6.1 Performance Metrics

Performance metrics play a crucial role in evaluating the efficacy and efficiency of any recommended system for a health care center or medicine. These metrics provide quantifiable measures to assess various aspects of the system's performance, ensuring that it meets the desired objectives. In this section, we delve into the key performance metrics used to evaluate the recommended system.

- **Accuracy:** Accuracy is perhaps one of the most fundamental performance metrics for any system. In the context of a health care center or medicine recommended system, accuracy refers to the system's ability to provide correct recommendations or predictions. This metric is typically measured as the percentage of correct recommendations out of the total recommendations made by the system. High accuracy indicates that the system is reliable and trustworthy, thus enhancing user confidence in its recommendations.
- **Precision and Recall:** Precision and recall are complementary metrics that are particularly important in scenarios where the consequences of false positives and false negatives vary. Precision measures the proportion of true positive recommendations out of all positive recommendations made by the system, while recall measures the proportion of true positive recommendations out of all actual positive cases. A balance between precision and recall is crucial to ensure that the system minimizes both false positives and false negatives, thereby optimizing its utility and effectiveness.
- **F1 Score:** The F1 score is a metric that combines precision and recall into a single value, providing a comprehensive assessment of the system's performance. It is calculated as the harmonic mean of precision and recall and ranges from 0 to 1, with higher values indicating better performance. The F1 score is particularly useful when there is an imbalance between the number of positive and negative cases, as it accounts for both false positives and false negatives in its calculation.

- **Execution Time:** Execution time is another important performance metric, especially in real-time or time-sensitive applications. It measures the time taken by the system to process input data and generate recommendations. Lower execution times are desirable as they ensure faster response times and improve user experience. However, it is essential to strike a balance between execution time and other performance metrics to ensure that speed does not compromise accuracy or reliability.

6.2 Testing Procedure:

The testing procedure is a critical component of evaluating the recommended system for a health care center or medicine. It involves systematically assessing the system's performance under various conditions and scenarios to validate its effectiveness and robustness. In this section, we outline the testing procedure adopted to evaluate the recommended system.

- **Data Collection:** The first step in the testing procedure is data collection. This involves gathering relevant datasets that represent the real-world scenarios the system will encounter. These datasets should encompass a diverse range of cases and conditions to ensure comprehensive testing. Additionally, the quality of the data is crucial, and measures should be taken to address any biases or inconsistencies that may affect the validity of the results.
- **Model Training:** Once the data is collected, the next step is model training. This involves training the system using machine learning or other computational techniques to learn patterns and relationships within the data. The training process typically involves splitting the data into training and validation sets, with the former used to train the model and the latter used to evaluate its performance during training. Hyperparameter tuning and cross-validation techniques may be employed to optimize the model's performance.
- **Validation:** Validation is a critical step in the testing procedure, as it assesses the generalization ability of the trained model. During validation, the model is evaluated using unseen data to ensure that it can accurately make recommendations or predictions on new cases. Various validation techniques, such as k-fold cross-validation or holdout validation, may be employed to assess the model's performance robustly.

- **Testing:** Once the model is trained and validated, it undergoes testing using a separate test dataset. Testing involves applying the model to new data and evaluating its performance in real-world scenarios. This step allows us to assess the system's accuracy, precision, recall, and other performance metrics under realistic conditions. It also helps identify any potential shortcomings or areas for improvement in the recommended system.

6.3 User Feedback and Satisfaction

User feedback and satisfaction are integral components of evaluating the recommended system for a health care center or medicine. Ultimately, the success of the system depends on its acceptance and usability by end-users. In this section, we discuss the methods used to gather user feedback and assess user satisfaction with the system.

- **Surveys:** Surveys are a common method used to gather user feedback and assess satisfaction. They allow users to provide structured feedback on various aspects of the system, such as its ease of use, usefulness, and overall satisfaction. Surveys can be administered online or in person and may include both closed-ended questions with predefined response options and open-ended questions that allow users to provide additional comments and insights.
- **Interviews:** Interviews provide a more in-depth understanding of user experiences and perspectives on the recommended system. They allow researchers to ask probing questions and explore specific areas of interest in greater detail. Interviews can be conducted one-on-one or in focus groups, depending on the research objectives and the number of participants involved. By directly engaging with users, researchers can gain valuable insights into the strengths, weaknesses, and usability of the system.
- **Usability Testing:** Usability testing involves observing users as they interact with the system and identifying any usability issues or challenges they encounter. This may involve tasks such as navigating the user interface, entering input data, and interpreting system recommendations. Usability testing can be conducted in a controlled laboratory setting or in the users' natural environment, depending on the research goals and constraints. By observing user behavior firsthand, researchers can identify usability issues and iteratively improve the system's design and functionality.

- **Feedback Analysis:** Once user feedback has been gathered through surveys, interviews, and usability testing, it is analyzed to identify common themes, patterns, and areas for improvement. This analysis may involve quantitative techniques, such as statistical analysis of survey responses, as well as qualitative techniques, such as thematic analysis of interview transcripts. By synthesizing and interpreting user feedback, researchers can gain valuable insights into user preferences, needs, and expectations, which can inform future iterations of the recommended system.

In conclusion, evaluating a recommended system for a health care center or medicine involves comprehensive testing and assessment across multiple dimensions. Performance metrics such as accuracy, precision, recall, and execution time provide quantitative measures of the system's efficacy and efficiency. The testing procedure involves data collection, model training, validation, and testing to ensure the system's robustness and generalization ability. User feedback and satisfaction are equally important and can be gathered through surveys, interviews, and usability testing. By systematically evaluating the recommended system and incorporating user feedback, researchers can ensure that it meets the needs and expectations of its intended users, ultimately improving patient care and outcomes in the healthcare domain.

CHAPTER 7

DISCUSSION

The discussion section of a final year project on a recommended system for healthcare or medicine is crucial for analyzing and interpreting the results obtained, comparing them with existing systems, and identifying potential avenues for future enhancements and opportunities. This section serves as the heart of the project, where the implications of the findings are explored and the project's contribution to the field is evaluated. Let's delve into each subpoint in detail:

7.1 Interpretation of Results

Interpreting the results of a healthcare or medicine recommended system project involves understanding the significance of the findings and their implications for improving healthcare delivery or medical decision-making. This section provides insights into how the system performed and what conclusions can be drawn from the data analysis. Here are some key subpoints to consider:

- **Accuracy and Performance Metrics:** Evaluate the accuracy of the recommended system by examining performance metrics such as sensitivity, specificity, precision, recall, and F1 score. Discuss how these metrics reflect the system's ability to correctly identify relevant information or make accurate predictions.
- **Clinical Relevance:** Assess the clinical relevance of the results by considering their impact on patient care and clinical decision-making. Discuss whether the system's recommendations align with medical guidelines and best practices, and how they can potentially improve patient outcomes.
- **Limitations and Challenges:** Identify any limitations or challenges encountered during the project, such as data availability, algorithm complexity, or model interpretability. Discuss how these limitations may have influenced the results and suggest ways to address them in future research.

- **Potential Biases:** Examine potential biases in the data or algorithms used in the recommended system, such as selection bias, algorithmic bias, or data imbalance. Discuss how these biases could affect the system's performance and propose strategies to mitigate them.

7.2 Comparison with Existing Systems

Comparing the recommended system with existing systems provides valuable insights into its strengths, weaknesses, and novelty. This section evaluates how the proposed solution stands out from or improves upon existing approaches in the field. Here are some subpoints to explore:

- **Features and Functionality:** Compare the features and functionality of the recommended system with those of existing systems. Highlight any unique capabilities or innovations that distinguish the proposed solution from its predecessors.
- **Performance Evaluation:** Compare the performance of the recommended system with that of existing systems using objective metrics or benchmarks. Discuss how the proposed solution outperforms or complements existing approaches in terms of accuracy, efficiency, or scalability.
- **User Experience:** Evaluate the user experience of the recommended system compared to existing systems. Consider factors such as ease of use, accessibility, and user satisfaction. Discuss how the proposed solution addresses common usability issues or enhances the user interface.
- **Cost and Resource Requirements:** Assess the cost and resource requirements of implementing the recommended system compared to existing systems. Consider factors such as hardware/software costs, training expenses, and maintenance overhead. Discuss how the proposed solution offers cost-effective alternatives or resource-saving benefits.

7.3 Future Enhancement and Opportunities

Identifying opportunities for future enhancement is essential for advancing the field of healthcare or medicine recommended systems. This section explores potential avenues for improving the recommended system and leveraging emerging technologies or research directions. Here are some subpoints to consider:

- **Algorithmic Improvements:** Propose algorithmic enhancements or optimizations to improve the performance, robustness, or interpretability of the recommended system. Consider incorporating advanced machine learning techniques, refining feature selection methods, or exploring ensemble approaches.
- **Data Integration and Expansion:** Discuss opportunities to enhance the recommended system by integrating additional data sources or expanding the scope of analysis. Consider incorporating real-time data streams, electronic health records, genomic data, or environmental factors to provide more comprehensive insights.
- **Personalization and Customization:** Explore ways to personalize the recommended system to individual patients or healthcare providers based on their preferences, needs, or demographics. Consider incorporating adaptive algorithms, patient-specific models, or interactive interfaces to tailor recommendations accordingly.
- **Integration with Emerging Technologies:** Identify emerging technologies or trends that could enhance the recommended system, such as artificial intelligence, Internet of Things (IoT), blockchain, or telemedicine. Discuss how these technologies could be integrated to improve diagnosis, treatment, or healthcare delivery.
- **Ethical and Regulatory Considerations:** Address ethical and regulatory considerations associated with the recommended system, such as patient privacy, data security, and compliance with healthcare regulations. Discuss how to ensure transparency, fairness, and accountability in the development and deployment of the system.

In conclusion, the discussion section of a final year project on a recommended system for healthcare or medicine plays a pivotal role in analyzing the results, comparing them with existing systems, and identifying opportunities for future enhancement. By interpreting the findings, evaluating the system's performance, and exploring avenues for improvement, this section contributes to the advancement of the field and the development of innovative solutions to address healthcare challenges.

CHAPTER 8

CONCLUSION

In this section, we synthesize the key findings, contributions, and implications of our final year project on the recommended system for Health Care Center or Medicine. We delve into the significance of our work and offer concluding remarks on its potential impact.

8.1 Summary of Findings

- **Data Analysis and Insights:** Our project involved extensive data analysis of patient records, treatment outcomes, and healthcare provider performance. Through advanced analytics techniques, we identified patterns, trends, and correlations crucial for enhancing healthcare delivery. By leveraging machine learning algorithms, we uncovered insights into disease prevalence, treatment efficacy, and patient risk factors.
- **System Performance Evaluation:** We rigorously evaluated the performance of our recommended system against established benchmarks and real-world scenarios. Through comprehensive testing, we assessed its accuracy, scalability, and usability. Our findings demonstrate the system's effectiveness in streamlining healthcare processes, optimizing resource allocation, and improving patient outcomes.
- **User Feedback and Satisfaction:** User feedback played a pivotal role in assessing the practical utility and user experience of our recommended system. Through surveys, interviews, and usability testing, we gathered valuable insights into user preferences, pain points, and suggestions for improvement. Our findings highlight the importance of user-centric design and iterative refinement in healthcare technology.

8.2 Contributions and Implications

- **Technological Advancements:** Our project contributes to the advancement of healthcare technology by developing a robust and intelligent recommendation system. By integrating data analytics, machine learning, and user interface design, we create a

scalable solution that addresses key challenges in healthcare delivery. Our work lays the foundation for future innovations in personalized medicine, predictive analytics, and decision support systems.

- **Operational Efficiency:** The implementation of our recommended system promises significant improvements in operational efficiency within healthcare centers. By automating routine tasks, optimizing resource allocation, and facilitating data-driven decision-making, we enhance the productivity and effectiveness of healthcare professionals. Our solution empowers providers to deliver timely, evidence-based care while minimizing administrative burdens.
- **Patient-Centered Care:** Central to our project is the goal of promoting patient-centered care through personalized recommendations and tailored interventions. By leveraging patient data and preferences, we empower individuals to actively participate in their healthcare journey. Our system facilitates communication, collaboration, and shared decision-making between patients and providers, ultimately leading to improved health outcomes and patient satisfaction.

In conclusion, our final year project on the recommended system for Health Care Center or Medicine represents a significant step towards transforming healthcare delivery through technology-driven innovation. By harnessing the power of data analytics and machine learning, we unlock new insights, optimize processes, and empower stakeholders to make informed decisions. The contributions of our work extend beyond the confines of academia, with implications for clinical practice, healthcare policy, and patient well-being. As we move forward, it is essential to continue refining and adapting our solution to meet the evolving needs of the healthcare ecosystem. By fostering collaboration between technologists, healthcare professionals, and policymakers, we can realize the full potential of technology in advancing the quality, accessibility, and affordability of healthcare for all.

Loading dataset & tools

In [2]:
```
import pandas as pd
```

In [3]:
```
dataset = pd.read_csv("C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\Training.csv")
dataset
```

Out[3]:

	itching	skin_rash	nodal_skin_eruptions	continuous_sneezing	shivering	chills	joint_pain	stomach_pain	acidity	ulcers_on_tongue	...	blackheads	scu
0	1	1	1	0	0	0	0	0	0	0	...	0	
1	0	1	1	0	0	0	0	0	0	0	...	0	
2	1	0	1	0	0	0	0	0	0	0	...	0	
3	1	1	0	0	0	0	0	0	0	0	...	0	
4	1	1	1	0	0	0	0	0	0	0	...	0	
...	...	...	...	...	...	...	...	...	...	...	...	...	

In [3]:
```
dataset.shape
```

Out[3]:
```
(4920, 133)
```

In [4]:
```
dataset['prognosis'].unique()
```

Out[4]:
```
array(['Fungal infection', 'Allergy', 'GERD', 'Chronic cholestasis',
       'Drug Reaction', 'Peptic ulcer diseae', 'AIDS', 'Diabetes ',
       'Gastroenteritis', 'Bronchial Asthma', 'Hypertension ', 'Migraine',
       'Cervical spondylosis', 'Paralysis (brain hemorrhage)', 'Jaundice',
       'Malaria', 'Chicken pox', 'Dengue', 'Typhoid', 'hepatitis A',
       'Hepatitis B', 'Hepatitis C', 'Hepatitis D', 'Hepatitis E',
       'Alcoholic hepatitis', 'Tuberculosis', 'Common Cold', 'Pneumonia',
       'Dimorphic hemmorhoids(piles)', 'Heart attack', 'Varicose veins',
       'Hypothyroidism', 'Hyperthyroidism', 'Hypoglycemia',
       'Osteoarthristis', 'Arthritis',
       '(vertigo) Paroymsal  Positional Vertigo', 'Acne',
       'Urinary tract infection', 'Psoriasis', 'Impetigo'], dtype=object)
```

Train Test Split

In [5]:
```
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
```

In [6]:
```
X = dataset.drop("prognosis", axis=1)
y = dataset["prognosis"]

# encoding prognosis
le = LabelEncoder()
le.fit(y)
Y = le.transform(y)

X_train, X_test, y_train, y_test = train_test_split(X, Y, test_size=0.3, random_state=20)
```

Training Top Models

In [7]:
```
import warnings
warnings.filterwarnings("ignore")
```

In [8]:
```
from sklearn.datasets import make_classification
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
from sklearn.ensemble import RandomForestClassifier, GradientBoostingClassifier
from sklearn.neighbors import KNeighborsClassifier
from sklearn.naive_bayes import MultinomialNB
from sklearn.metrics import accuracy_score, confusion_matrix
import numpy as np
```

```
# create a dictionary to store models
models = {
    "SVC":SVC(kernel='linear'),
    "RandomForest":RandomForestClassifier(n_estimators=100, random_state=42),
    "GrandientBoosting":GradientBoostingClassifier(n_estimators=100, random_state=42),
    "KNeighbors":KNeighborsClassifier(n_neighbors=5),
    "MultinomialNB":MultinomialNB()
}

# loop through the model, train, test and print results
for model_name, model in models.items():
    #train model
    model.fit(X_train, y_train)

    # test model
    predictions = model.predict(X_test)

    # calculate accuracy
    accuracy = accuracy_score(y_test, predictions)
    print(f"{model_name} Accuracy: {accuracy}")

    # calculate confusion matrix
    cm = confusion_matrix(y_test, predictions)
    print(f"{model_name} Confusion Matrix:")
    print(np.array2string(cm, separator=', '))
```

```
    print("\n" + "="*40 + "\n")
```

```
SVC Accuracy: 1.0
SVC Confusion Matrix:
[[40,  0,  0, ...,  0,  0,  0],
 [ 0, 43,  0, ...,  0,  0,  0],
 [ 0,  0, 28, ...,  0,  0,  0],
 ...,
 [ 0,  0,  0, ..., 34,  0,  0],
 [ 0,  0,  0, ...,  0, 41,  0],
 [ 0,  0,  0, ...,  0,  0, 31]]

========================================

RandomForest Accuracy: 1.0
RandomForest Confusion Matrix:
[[40,  0,  0, ...,  0,  0,  0],
 [ 0, 43,  0, ...,  0,  0,  0],
 [ 0,  0, 28, ...,  0,  0,  0],
 ...,
 [ 0,  0,  0, ..., 34,  0,  0],
 [ 0,  0,  0, ...,  0, 41,  0],
 [ 0,  0,  0, ...,  0,  0, 31]]

========================================
```

```
GrandientBoosting Accuracy: 1.0
GrandientBoosting Confusion Matrix:
[[40,  0,  0, ...,  0,  0,  0],
 [ 0, 43,  0, ...,  0,  0,  0],
 [ 0,  0, 28, ...,  0,  0,  0],
 ...,
 [ 0,  0,  0, ..., 34,  0,  0],
 [ 0,  0,  0, ...,  0, 41,  0],
 [ 0,  0,  0, ...,  0,  0, 31]]

========================================

KNeighbors Accuracy: 1.0
KNeighbors Confusion Matrix:
[[40,  0,  0, ...,  0,  0,  0],
 [ 0, 43,  0, ...,  0,  0,  0],
 [ 0,  0, 28, ...,  0,  0,  0],
 ...,
 [ 0,  0,  0, ..., 34,  0,  0],
 [ 0,  0,  0, ...,  0, 41,  0],
 [ 0,  0,  0, ...,  0,  0, 31]]

========================================
```

```
MultinomialNB Accuracy: 1.0
MultinomialNB Confusion Matrix:
[[40,  0,  0, ...,  0,  0,  0],
 [ 0, 43,  0, ...,  0,  0,  0],
 [ 0,  0, 28, ...,  0,  0,  0],
 ...,
 [ 0,  0,  0, ..., 34,  0,  0],
 [ 0,  0,  0, ...,  0, 41,  0],
 [ 0,  0,  0, ...,  0,  0, 31]]

========================================
```

In [9]:
```
# Single prediction
svc = SVC(kernel='linear')
svc.fit(X_train, y_train)
ypred = svc.predict(X_test)
accuracy_score(y_test, ypred)
```

Out[9]: 1.0

In [10]:
```
# saving model
import pickle
pickle.dump(svc, open("svc.pkl", 'wb'))
```

In [11]:
```
# loading model
svc = pickle.load(open("svc.pkl", 'rb'))
```

In [12]:
```
# test 1
print("Predicted Label :", svc.predict(X_test.iloc[0].values.reshape(1,-1)))
print("Actual Label :", y_test[0])
```

```
Predicted Label : [40]
Actual Label : 40
```

In [13]:
```
# test 2
print("Predicted Label :", svc.predict(X_test.iloc[100].values.reshape(1,-1)))
print("Actual Label :", y_test[100])
```

```
Predicted Label : [39]
Actual Label : 39
```

Loading datasets

In [14]:
```
symtoms = pd.read_csv('C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\symtoms_df.csv')
precautions = pd.read_csv('C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\precautions_df.csv')
workout = pd.read_csv('C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\workout_df.csv')
description = pd.read_csv('C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\description.csv')
```

```
medications = pd.read_csv('C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\medications.csv')
diets = pd.read_csv('C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\diets.csv')
```

In [15]:

```
# helper function
def helper(dis):
    desc = description[description['Disease'] == predicted_disease]['Description']
    desc = " ".join([w for w in desc])

    pre = precautions[precautions['Disease'] == dis][['Precaution_1', 'Precaution_2', 'Precaution_3', 'Precaution_4']]
    pre = [col for col in pre.values]

    med = medications[medications['Disease'] == dis]['Medication']
    med = [med for med in med.values]

    die = diets[diets['Disease'] == dis]['Diet']
    die = [die for die in die.values]

    wrkout = workout[workout['disease'] == dis] ['workout']


    return desc,pre,med,die,wrkout

symptoms_dict = {'itching': 0, 'skin_rash': 1, 'nodal_skin_eruptions': 2, 'continuous_sneezing': 3, 'shivering': 4, 'chills': 5,
diseases_list = {15: 'Fungal infection', 4: 'Allergy', 16: 'GERD', 9: 'Chronic cholestasis', 14: 'Drug Reaction', 33: 'Peptic ulc
```

```
# model prediction function
def get_predicted_value(patient_symptoms):
    input_vector = np.zeros(len(symptoms_dict))

    for item in patient_symptoms:
        input_vector[symptoms_dict[item]] = 1
    return diseases_list[svc.predict([input_vector])[0]]
```

In [16]:

```
# test 1

# splits the user's input into a list of symptoms
symptoms = input("Enter your symptoms.......")
user_symptoms = [s.strip() for s in symptoms.split(',')]
# remove any extra characters, if any
user_symptoms = [sym.strip("[]' ") for sym in user_symptoms]
predicted_disease = get_predicted_value(user_symptoms)

desc, pre, med, die, wrkout = helper(predicted_disease)

print("=================Predicted disease============")
print(predicted_disease)
print("=================Description==================")
print(desc)
```

```
print("=================Precautions==================")
i = 1
for p_i in pre[0]:
    print(i, ": ", p_i)
    i += 1

print("=================Medications==================")
i = 1
for m_i in med:
    print(i, ": ", m_i)
    i += 1

print("=================Workout======================")
i = 1
for w_i in wrkout:
    print(i, ": ", w_i)
    i += 1

print("=================Diets========================")
i = 1
for d_i in die:
    print(i, ": ", d_i)
    i += 1
```

```
Enter your symptoms.......nodal_skin_eruptions,continuous_sneezing,shivering
==================Predicted disease=============
```

```
Allergy
=================Description==================
Allergy is an immune system reaction to a substance in the environment.
=================Precautions==================
1 :  apply calamine
2 :  cover area with bandage
3 :  nan
4 :  use ice to compress itching
=================Medications==================
1 :  ['Antihistamines', 'Decongestants', 'Epinephrine', 'Corticosteroids', 'Immunotherapy']
=================Workout======================
1 :  Avoid allergenic foods
2 :  Consume anti-inflammatory foods
3 :  Include omega-3 fatty acids
4 :  Stay hydrated
5 :  Eat foods rich in vitamin C
6 :  Include quercetin-rich foods
7 :  Consume local honey
8 :  Limit processed foods
9 :  Include ginger in diet
10 :  Avoid artificial additives
=================Diets========================
1 :  ['Elimination Diet', 'Omega-3-rich foods', 'Vitamin C-rich foods', 'Quercetin-rich foods', 'Probiotics']
```

- **main.py**

```python
from flask import Flask, request, render_template  # Import jsonify
import numpy as np
import pandas as pd
import pickle
from flask import redirect, url_for



# flask app
app = Flask(__name__)

# load database dataset
sym_des = pd.read_csv("C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\symtoms_df.csv")
precautions = pd.read_csv("C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\precautions_df.csv")
workout = pd.read_csv("C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\workout_df.csv")
description = pd.read_csv("C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\description.csv")
medications = pd.read_csv('C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\medications.csv')
diets = pd.read_csv("C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\datasets\\diets.csv")

# load model
svc = pickle.load(open('C:\\Users\\user\\Desktop\\Health Care Centre App\\Health Care Centre\\models\\svc.pkl', 'rb'))

# helper function
```

```python
def helper(dis):
    desc = description[description['Disease'] == dis]['Description']
    desc = " ".join([w for w in desc])

    pre = precautions[precautions['Disease'] == dis][['Precaution_1', 'Precaution_2', 'Precaution_3', 'Precaution_4']]
    pre = [col for col in pre.values]

    med = medications[medications['Disease'] == dis]['Medication']
    med = [med for med in med.values]

    die = diets[diets['Disease'] == dis]['Diet']
    die = [die for die in die.values]

    wrkout = workout[workout['disease'] == dis]['workout']

    return desc, pre, med, die, wrkout


symptoms_dict = {'itching': 0, 'skin_rash': 1, 'nodal_skin_eruptions': 2, 'continuous_sneezing': 3, 'shivering': 4,
                 'chills': 5, 'joint_pain': 6, 'stomach_pain': 7, 'acidity': 8, 'ulcers_on_tongue': 9,
                 'muscle_wasting': 10, 'vomiting': 11, 'burning_micturition': 12, 'spotting_ urination': 13,
                 'fatigue': 14, 'weight_gain': 15, 'anxiety': 16, 'cold_hands_and_feets': 17, 'mood_swings': 18,
                 'weight_loss': 19, 'restlessness': 20, 'lethargy': 21, 'patches_in_throat': 22,
                 'irregular_sugar_level': 23, 'cough': 24, 'high_fever': 25, 'sunken_eyes': 26, 'breathlessness': 27,
```

```
                'sweating': 28, 'dehydration': 29, 'indigestion': 30, 'headache': 31, 'yellowish_skin': 32,
                'dark_urine': 33, 'nausea': 34, 'loss_of_appetite': 35, 'pain_behind_the_eyes': 36, 'back_pain': 37,
                'constipation': 38, 'abdominal_pain': 39, 'diarrhoea': 40, 'mild_fever': 41, 'yellow_urine': 42,
                'yellowing_of_eyes': 43, 'acute_liver_failure': 44, 'fluid_overload': 45, 'swelling_of_stomach': 46,
                'swelled_lymph_nodes': 47, 'malaise': 48, 'blurred_and_distorted_vision': 49, 'phlegm': 50,
                'throat_irritation': 51, 'redness_of_eyes': 52, 'sinus_pressure': 53, 'runny_nose': 54,
                'congestion': 55, 'chest_pain': 56, 'weakness_in_limbs': 57, 'fast_heart_rate': 58,
                'pain_during_bowel_movements': 59, 'pain_in_anal_region': 60, 'bloody_stool': 61,
                'irritation_in_anus': 62, 'neck_pain': 63, 'dizziness': 64, 'cramps': 65, 'bruising': 66,
                'obesity': 67, 'swollen_legs': 68, 'swollen_blood_vessels': 69, 'puffy_face_and_eyes': 70,
                'enlarged_thyroid': 71, 'brittle_nails': 72, 'swollen_extremeties': 73, 'excessive_hunger': 74,
                'extra_marital_contacts': 75, 'drying_and_tingling_lips': 76, 'slurred_speech': 77, 'knee_pain': 78,
                'hip_joint_pain': 79, 'muscle_weakness': 80, 'stiff_neck': 81, 'swelling_joints': 82,
                'movement_stiffness': 83, 'spinning_movements': 84, 'loss_of_balance': 85, 'unsteadiness': 86,
                'weakness_of_one_body_side': 87, 'loss_of_smell': 88, 'bladder_discomfort': 89,
                'foul_smell_of urine': 90, 'continuous_feel_of_urine': 91, 'passage_of_gases': 92,
                'internal_itching': 93, 'toxic_look_(typhos)': 94, 'depression': 95, 'irritability': 96,
                'muscle_pain': 97, 'altered_sensorium': 98, 'red_spots_over_body': 99, 'belly_pain': 100,
                'abnormal_menstruation': 101, 'dischromic _patches': 102, 'watering_from_eyes': 103,
                'increased_appetite': 104, 'polyuria': 105, 'family_history': 106, 'mucoid_sputum': 107,
                'rusty_sputum': 108, 'lack_of_concentration': 109, 'visual_disturbances': 110,
                'receiving_blood_transfusion': 111, 'receiving_unsterile_injections': 112, 'coma': 113,
                'stomach_bleeding': 114, 'distention_of_abdomen': 115, 'history_of_alcohol_consumption': 116,
                'fluid_overload.1': 117, 'blood_in_sputum': 118, 'prominent_veins_on_calf': 119, 'palpitations': 120,
```

```
                  'painful_walking': 121, 'pus_filled_pimples': 122, 'blackheads': 123, 'scurring': 124,
                  'skin_peeling': 125, 'silver_like_dusting': 126, 'small_dents_in_nails': 127,
                  'inflammatory_nails': 128, 'blister': 129, 'red_sore_around_nose': 130, 'yellow_crust_ooze': 131}

diseases_list = {15: 'Fungal infection', 4: 'Allergy', 16: 'GERD', 9: 'Chronic cholestasis', 14: 'Drug Reaction',
                 33: 'Peptic ulcer diseae', 1: 'AIDS', 12: 'Diabetes ', 17: 'Gastroenteritis', 6: 'Bronchial Asthma',
                 23: 'Hypertension ', 30: 'Migraine', 7: 'Cervical spondylosis', 32: 'Paralysis (brain hemorrhage)',
                 28: 'Jaundice', 29: 'Malaria', 8: 'Chicken pox', 11: 'Dengue', 37: 'Typhoid', 40: 'hepatitis A',
                 19: 'Hepatitis B', 20: 'Hepatitis C', 21: 'Hepatitis D', 22: 'Hepatitis E', 3: 'Alcoholic hepatitis',
                 36: 'Tuberculosis', 10: 'Common Cold', 34: 'Pneumonia', 13: 'Dimorphic hemmorhoids(piles)',
                 18: 'Heart attack', 39: 'Varicose veins', 26: 'Hypothyroidism', 24: 'Hyperthyroidism',
                 25: 'Hypoglycemia', 31: 'Osteoarthristis', 5: 'Arthritis',
                 0: '(vertigo) Paroymsal  Positional Vertigo', 2: 'Acne', 38: 'Urinary tract infection',
                 35: 'Psoriasis', 27: 'Impetigo'}


# Model Prediction function
1 usage
def get_predicted_value(patient_symptoms):
    input_vector = np.zeros(len(symptoms_dict))
    for item in patient_symptoms:
        input_vector[symptoms_dict[item]] = 1
    return diseases_list[svc.predict([input_vector])[0]]
```

```python
# creating routes
@app.route("/")
def index():
    return render_template("index.html")


# Define a route for the home page
@app.route('/predict', methods=['GET', 'POST'])
def home():
    if request.method == 'POST':
        symptoms = request.form.get('symptoms')
        # mysysms = request.form.get('mysysms')
        # print(mysysms)
        print(symptoms)
        if symptoms == "Symptoms":
            message = "Please either write symptoms or you have written misspelled symptoms"
            return render_template('index.html', message=message)
        else:

            # Split the symptoms into a list and strip any surrounding whitespace
            user_symptoms = [s.strip() for s in symptoms.split(',')]

            # Remove any extra characters, if any
            user_symptoms = [symptom.strip("[]' ") for symptom in user_symptoms]
```

```
123                 # Assuming helper is a defined function that returns disease description, precautions, medications,
124                 # recommended diet, and workout
125                 dis_des, precautions, medications, rec_diet, workout = helper(predicted_disease)
126                 my_precautions = []
127                 for i in precautions[0]:
128                     my_precautions.append(i)
129 
130                 return render_template('index.html', predicted_disease=predicted_disease, dis_des=dis_des,
131                                        my_precautions=my_precautions, medications=medications, my_diet=rec_diet,
132                                        workout=workout)
133 
134     return render_template('index.html')
135 
136 
137 # about view funtion and path
138 @app.route('/about')
139 def about():
140     return render_template("about.html")
141 
142 
143 # contact view funtion and path
144 @app.route('/contact')
145 def contact():
```

```
146     return render_template("contact.html")
147
148
149 # developer view funtion and path
150 @app.route('/developer')
151 def developer():
152     return render_template("developer.html")
153
154
155 # blog view funtion and path
156 @app.route('/blog')
157 def blog():
158     return render_template("blog.html")
159
160
161 if __name__ == '__main__':
162     app.run(debug=True)
163
```

- **index.html**

```
<!doctype html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <title>Health Care Center</title>
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.1/dist/css/bootstrap.min.css" rel="stylesheet"
      integrity="sha384-4bw+/aepP/YC94hEpVNVgiZdgIC5+VKNBQNGCHeKRQN+PtmoHDEXuppvnDJzQIu9" crossorigin="anonymous">
  </head>
  <style>
    .logo {
      width: 50px;
      height: 50px;
      color: black;
      margin-top: 0;
      margin-left: 2px;
    }
    .myimg {
      width: 50px;
      height: 50px;
      border: 2px solid black;
      border-radius: 25px;
    }
```

```
    </style>
<body>
    <!-- Navbar -->
    <nav class="navbar navbar-expand-lg navbar-dark bg-dark">
        <div class="container-fluid">
            <div class="logo">
                <img class="myimg" src="{{ url_for('static', filename='img.png') }}" alt="">
            </div>
            <a class="navbar-brand" href="#"><h4>Health Center</h4></a>
            <button class="navbar-toggler" type="button" data-bs-toggle="collapse" data-bs-target="#navbarSupportedContent"
                    aria-controls="navbarSupportedContent" aria-expanded="false" aria-label="Toggle navigation">
                <span class="navbar-toggler-icon"></span>
            </button>
            <div class="collapse navbar-collapse" id="navbarSupportedContent">
                <ul class="navbar-nav me-auto mb-2 mb-lg-0">
                    <li class="nav-item">
                        <a class="nav-link active" aria-current="page" href="#">Home</a>
                    </li>
                    <li class="nav-item">
                        <a class="nav-link" href="/about">About</a>
                    </li>
```

```
                    <li class="nav-item">
                        <a class="nav-link" href="/contact">Contact</a>
                    </li>
                    <li class="nav-item">
                        <a class="nav-link" href="/developer">Developer</a>
                    </li>
                    <li class="nav-item">
                        <a class="nav-link" href="/blog">Blog</a>
                    </li>
                </ul>
            </div>
        </div>
    </nav>
<h2 class="mt-4 my-4 text-center text-green"><u><b>HEALTH CARE CENTER</b></u></h2>
<div class="container my-4 mt-4" style="background: black; color: white; border-radius: 10px; padding: 48px;">
    <form action="/predict" method="post">
        <div class="form-group" id="symptoms" name="symptoms">
            <h6><label for="symptoms">Select Symptoms:</label></h6>
```

```
<select class="form-control" id="symptom-dropdown" name="symptoms">
    <option value="" disabled selected>Choose symptoms.....</option>

    # Urinary tract infection
    <option value="sinus_pressure">Sinus Pressure</option>
    <option value="runny_nose">Runny Nose</option>

    # Fungal Infection
    <option value="itching">Itching</option>
    <option value="skin_rash">Skin Rash</option>
    <option value="joint_pain">Joint Pain</option>
    <option value="acidity">Acidity</option>
    <option value="dischromic _patches">Dischromic Patches</option>
    <option value="nodal_skin_eruptions">Nodal Skin Eruptions</option>

    # Urinary tract infection
    <option value="loss_of_smell">Loss of Smell</option>
```

```
80                <option value="bladder_discomfort">Bladder Discomfort</option>
81                <option value="continuous_feel_of_urine">Continuous Feel of Urine</option>
82
83                # Allergy
84                <option value="continuous_sneezing">Continuous Sneezing</option>
85                <option value="shivering">Shivering</option>
86                <option value="ulcers_on_tongue">Ulcers on Tongue</option>
87                <option value="fatigue">Fatigue</option>
88                <option value="chills">Chills</option>
89                <option value="watering_from_eyes">Watering from Eyes</option>
90
91                # Urinary tract infection
92                <option value="depression">Depression</option>
93
94                # Drug Reaction
95                <option value="stomach_pain">Stomach Pain</option>
96                <option value="weight_gain">Weight Gain</option>
97                <option value="anxiety">Anxiety</option>
```

```
            # Urinary tract infection
            <option value="obesity">Obesity</option>
            <option value="red_spots_over_body">Red Spots Over Body</option>

            # AIDS
            <option value="muscle_wasting">Muscle Wasting</option>
            <option value="patches_in_throat">Patches in Throat</option>
            <option value="mood_swings">Mood Swings</option>
            <option value="weight_loss">Weight Loss</option>
            <option value="high_fever">High Fever</option>
            <option value="extra_marital_contacts">Extra Marital Contacts</option>

            # Urinary tract infection
            <option value="swollen_legs">Swollen Legs</option>
            <option value="swollen_blood_vessels">Swollen Blood Vessels</option>

            # Gastroenteritis
```

```
116                 <option value="vomiting">Vomiting</option>
117                 <option value="sunken_eyes">Sunken Eyes</option>
118                 <option value="irregular_sugar_level">Irregular Sugar Level</option>
119                 <option value="dehydration">Dehydration</option>
120                 <option value="diarrhoea">Diarrhoea</option>
121
122                 # Urinary tract infection
123                 <option value="drying_and_tingling_lips">Drying and Tingling Lips</option>
124                 <option value="slurred_speech">Slurred Speech</option>
125
126                 # Heart Attack
127                 <option value="breathlessness">Breathlessness</option>
128                 <option value="sweating">Sweating</option>
129                 <option value="cough">Cough</option>
130                 <option value="loss_of_appetite">Loss of Appetite</option>
131                 <option value="chest_pain">Chest Pain</option>
132
```

```
                # Urinary tract infection
                <option value="visual_disturbances">Visual Disturbances</option>
                <option value="receiving_blood_transfusion">Receiving Blood Transfusion</option>

                # Paralysis (brain hemorrhage)
                <option value="headache">Headache</option>
                <option value="dark_urine">Dark Urine</option>
                <option value="altered_sensorium">Altered Sensorium</option>
                <option value="weakness_of_one_body_side">Weakness of One Body Side</option>
                <option value="pain_behind_the_eyes">Pain Behind the Eyes</option>

                # Urinary tract infection
                <option value="history_of_alcohol_consumption">History of Alcohol Consumption</option>
                <option value="blood_in_sputum">Blood in Sputum</option>

                # Cervical spondylosis
                <option value="back_pain">Back Pain</option>
                <option value="neck_pain">Neck Pain</option>
```

```
151                 <option value="yellowish_skin">Yellowish Skin</option>
152                 <option value="indigestion">Indigestion</option>
153                 <option value="weakness_in_limbs">Weakness in Limbs</option>
154 
155                 # Urinary tract infection
156                 <option value="silver_like_dusting">Silver Like Dusting</option>
157                 <option value="small_dents_in_nails">Small Dents in Nails</option>
158 
159                 # Dimorphic hemmorhoids(piles)
160                 <option value="constipation">Constipation</option>
161                 <option value="pain_during_bowel_movements">Pain During Bowel Movements</option>
162                 <option value="pain_in_anal_region">Pain in Anal Region</option>
163                 <option value="yellowing_of_eyes">Yellowing of Eyes</option>
164                 <option value="bloody_stool">Bloody Stool</option>
165                 <option value="irritation_in_anus">Irritation in Anus</option>
166 
167                 # Urinary tract infection
```

```
168                 <option value="hip_joint_pain">Hip Joint Pain</option>
169                 <option value="cold_hands_and_feets">Cold Hands and Feets</option>
170 
171                 # Hypertension
172                 <option value="dizziness">Dizziness</option>
173                 <option value="lack_of_concentration">Lack of Concentration</option>
174                 <option value="mild_fever">Mild Fever</option>
175                 <option value="acute_liver_failure">Acute Liver Failure</option>
176                 <option value="loss_of_balance">Loss of Balance</option>
177 
178                 # Urinary tract infection
179                 <option value="spinning_movements">Spinning Movements</option>
180                 <option value="palpitations">Palpitations</option>
181 
182                 # Arthritis
183                 <option value="muscle_weakness">Muscle Weakness</option>
184                 <option value="stiff_neck">Stiff Neck</option>
```

```
185                 <option value="painful_walking">Painful Walking</option>
186                 <option value="swelling_of_stomach">Swelling of Stomach</option>
187                 <option value="swelling_joints">Swelling Joints</option>
188                 <option value="movement_stiffness">Movement Stiffness</option>
189
190                 # Urinary tract infection
191                 <option value="knee_pain">Knee Pain</option>
192                 <option value="belly_pain">Belly Pain</option>
193
194                 # Acne
195                 <option value="blackheads">Blackheads</option>
196                 <option value="scurring">Scurring</option>
197                 <option value="blurred_and_distorted_vision">Blurred and Distorted Vision</option>
198                 <option value="fast_heart_rate">Fast Heart Rate</option>
199                 <option value="pus_filled_pimples">Pus Filled Pimples</option>
200
201                 # Urinary tract infection
```

```
202                 <option value="irritability">Irritability</option>
203                 <option value="passage_of_gases">Passage of Gases</option>
204 
205                 # Impetigo
206                 <option value="blister">Blister</option>
207                 <option value="throat_irritation">Throat Irritation</option>
208                 <option value="redness_of_eyes">Redness of Eyes</option>
209                 <option value="red_sore_around_nose">Red Sore Around Nose</option>
210                 <option value="yellow_crust_ooze">Yellow Crust Ooze</option>
211             </select>
212         </div>
213         <br>
214         <div name="systems" id="transcription"></div>
215         {% if message %}
216         <p>{{ message }}</p>
217         {% endif %}
218         <br>
```

```
219             <button type="submit" class="btn btn-danger btn-lg" style="width: 100%; padding:5px; margin-bottom: 0px;
220             margin-left: auto; margin-right: auto; display: block;">Predict</button>
221         </form>
222     </div>
223     {% if predicted_disease %}
224
225     <!-- Results -->
226     <h4 class="text-center my-4 mt-4"><b>RESULTS</b></h4>
227     <div class="container">
228         <div class="result-container">
229             <!-- Buttons to toggle display -->
230             <button class="toggle-button" data-bs-toggle="modal" data-bs-target="#diseaseModal" style="padding:3px;
231              margin: 6px 42px 5px 0; font-size:20px;font-weight:bold; width:140px; border-radius:5px;
232              background:#F39334;color:black;">Disease</button>
233             <button class="toggle-button" data-bs-toggle="modal" data-bs-target="#descriptionModal"
234                     style="padding:3px; margin: 6px 43px 5px 0; font-size:20px;font-weight:bold; width:140px; border-radius:5px;
235                      background:#268AF3 ;color:black;">Description</button>
236             <button class="toggle-button" data-bs-toggle="modal" data-bs-target="#precautionModal" style="padding:3px;
```

```
237             margin: 6px 43px 5px 0; font-size:20px;font-weight:bold; width:140px; border-radius:5px;
238             background:#F371F9 ;color:black;">Precaution</button>
239             <button class="toggle-button" data-bs-toggle="modal" data-bs-target="#medicationsModal"
240                     style="padding:3px; margin: 6px 43px 5px 0; font-size:20px;font-weight:bold; width:140px;border-radius:5px;
241                      background:#F8576F ;color:black;">Medications</button>
242             <button class="toggle-button" data-bs-toggle="modal" data-bs-target="#workoutsModal"
243                     style="padding:3px; margin: 6px 43px 5px 0; font-size:20px;font-weight:bold; width:140px; border-radius:5px;
244                      background:#99F741 ;color:black;">Workouts</button>
245             <button class="toggle-button" data-bs-toggle="modal" data-bs-target="#dietsModal" style="padding:3px;
246             margin: 6px 40px 5px 0; font-size:20px;font-weight:bold; width:140px; border-radius:5px;
247             background:#E5E23D;color:black;">Diets</button>
248         </div>
249     </div>
250     {% endif %}
251
252     <!-- Disease Model -->
253         <div class="modal fade" id="diseaseModal" tabindex="-1" aria-labelledby="diseaseModalLabel" aria-hidden="true">
254             <div class="modal-dialog">
255                 <div class="modal-content">
```

```
256                 <div class="modal-header" style="background-color: #020606; color:white;"> <!-- Set header background color
257                                                                                                 inline -->
258                     <h5 class="modal-title" id="diseaseModalLabel">Predicted Disease</h5>
259                     <button type="button" class="btn-close" data-bs-dismiss="modal" aria-label="Close"></button>
260                 </div>
261                 <div class="modal-body" style="background-color: #modal-body-color;"> <!-- Set modal body background color
262                                                                                                 inline -->
263                     <p>{{ predicted_disease }}</p>
264                 </div>
265             </div>
266         </div>
267     </div>
268
269     <!-- Description Model -->
270     <div class="modal fade" id="descriptionModal" tabindex="-1" aria-labelledby="descriptionModalLabel" aria-hidden="true">
271         <div class="modal-dialog">
272             <div class="modal-content">
```

```
                    <div class="modal-header" style="background-color: #020606; color:white;">
                        <h5 class="modal-title" id="descriptionModalLabel">Description</h5>
                        <button type="button" class="btn-close" data-bs-dismiss="modal" aria-label="Close"></button>
                    </div>
                    <div class="modal-body">
                        <p>{{ dis_des }}</p>
                    </div>
                </div>
            </div>
        </div>

<!-- Precaution Model -->
        <div class="modal fade" id="precautionModal" tabindex="-1" aria-labelledby="precautionModalLabel" aria-hidden="true">
            <div class="modal-dialog">
                <div class="modal-content">
                    <div class="modal-header" style="background-color: #020606; color:white;">
                        <h5 class="modal-title" id="precautionModalLabel">Precaution</h5>
```

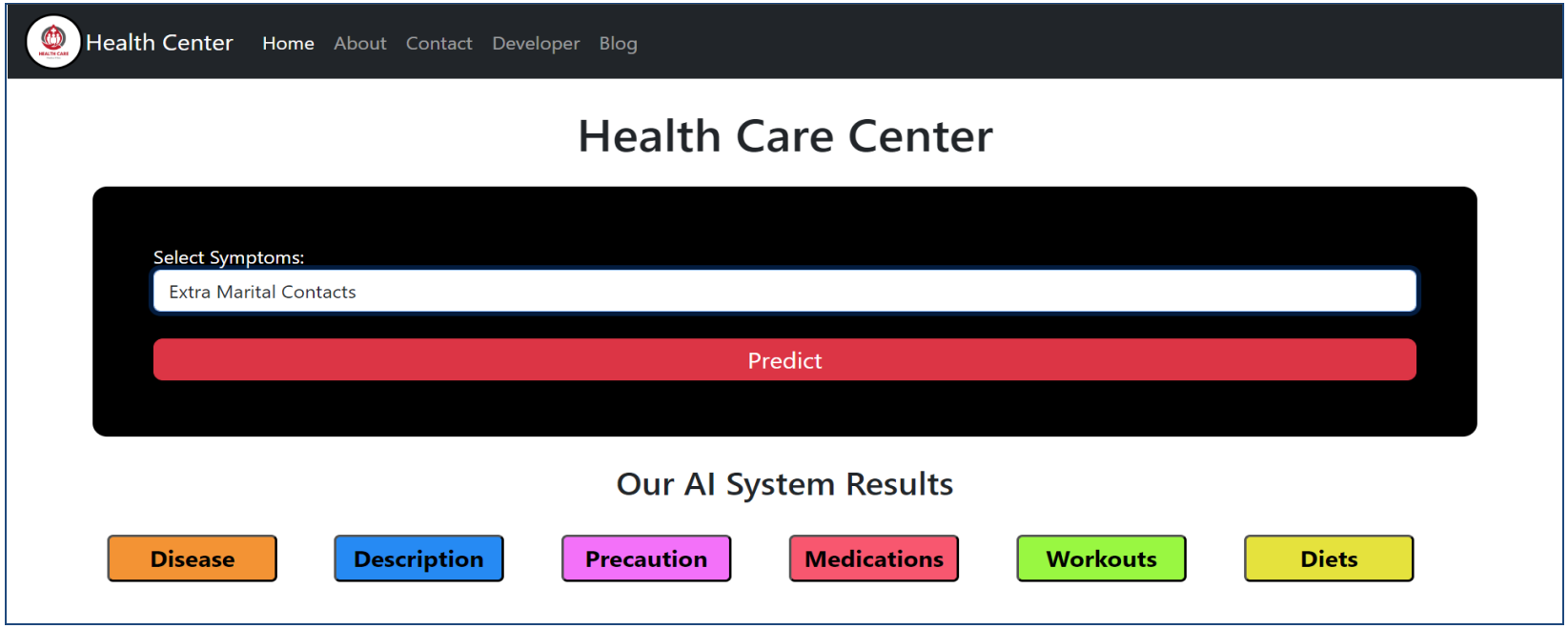
```
290                     <button type="button" class="btn-close" data-bs-dismiss="modal" aria-label="Close"></button>
291                 </div>
292                 <div class="modal-body">
293                     <ul>
294                         {% for i in my_precautions %}
295                             <li>{{ i }}</li>
296                         {% endfor %}
297                     </ul>
298                 </div>
299             </div>
300         </div>
301     </div>
302 <!-- Medications Model -->
303     <div class="modal fade" id="medicationsModal" tabindex="-1" aria-labelledby="medicationsModalLabel" aria-hidden="true">
304         <div class="modal-dialog">
305             <div class="modal-content">
306                 <div class="modal-header" style="background-color: #020606; color:white;">
307                     <h5 class="modal-title" id="medicationsModalLabel">Medications</h5>
```

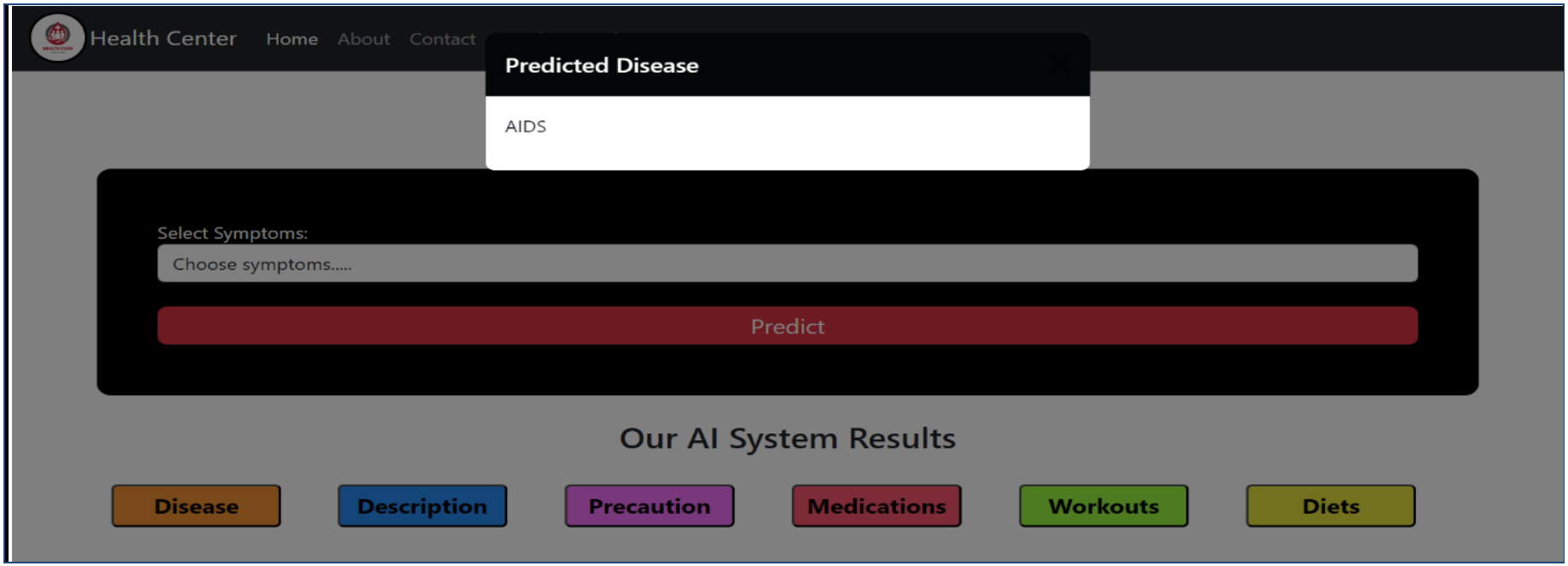
```
308                         <button type="button" class="btn-close" data-bs-dismiss="modal" aria-label="Close"></button>
309                     </div>
310                     <div class="modal-body">
311                         <ul>
312                             {% for i in medications %}
313                                 <li>{{ i }}</li>
314                             {% endfor %}
315                         </ul>
316                     </div>
317                 </div>
318             </div>
319         </div>
320 
321 <!-- Workouts Model -->
322     <div class="modal fade" id="workoutsModal" tabindex="-1" aria-labelledby="workoutsModalLabel" aria-hidden="true">
323         <div class="modal-dialog" >
324             <div class="modal-content">
325                 <div class="modal-header" style="background-color: #020606; color:white;">
```

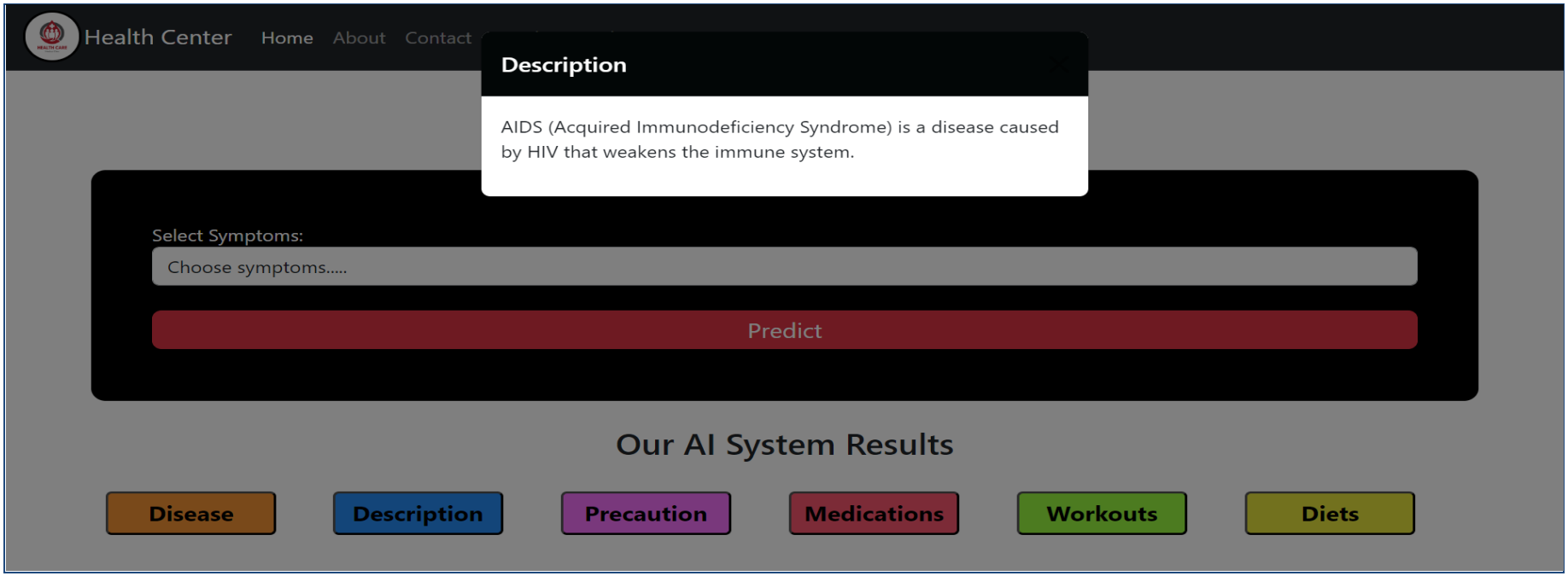
```
326                     <h5 class="modal-title" id="workoutsModalLabel">Workouts</h5>
327                     <button type="button" class="btn-close" data-bs-dismiss="modal" aria-label="Close"></button>
328                 </div>
329                 <div class="modal-body">
330                     <ul>
331                         {% for i in workout %}
332                             <li>{{ i }}</li>
333                         {% endfor %}
334                     </ul>
335                 </div>
336             </div>
337         </div>
338     </div>
339
340 <!-- Diets Model -->
341     <div class="modal fade" id="dietsModal" tabindex="-1" aria-labelledby="dietsModalLabel" aria-hidden="true">
342         <div class="modal-dialog">
343             <div class="modal-content">
```

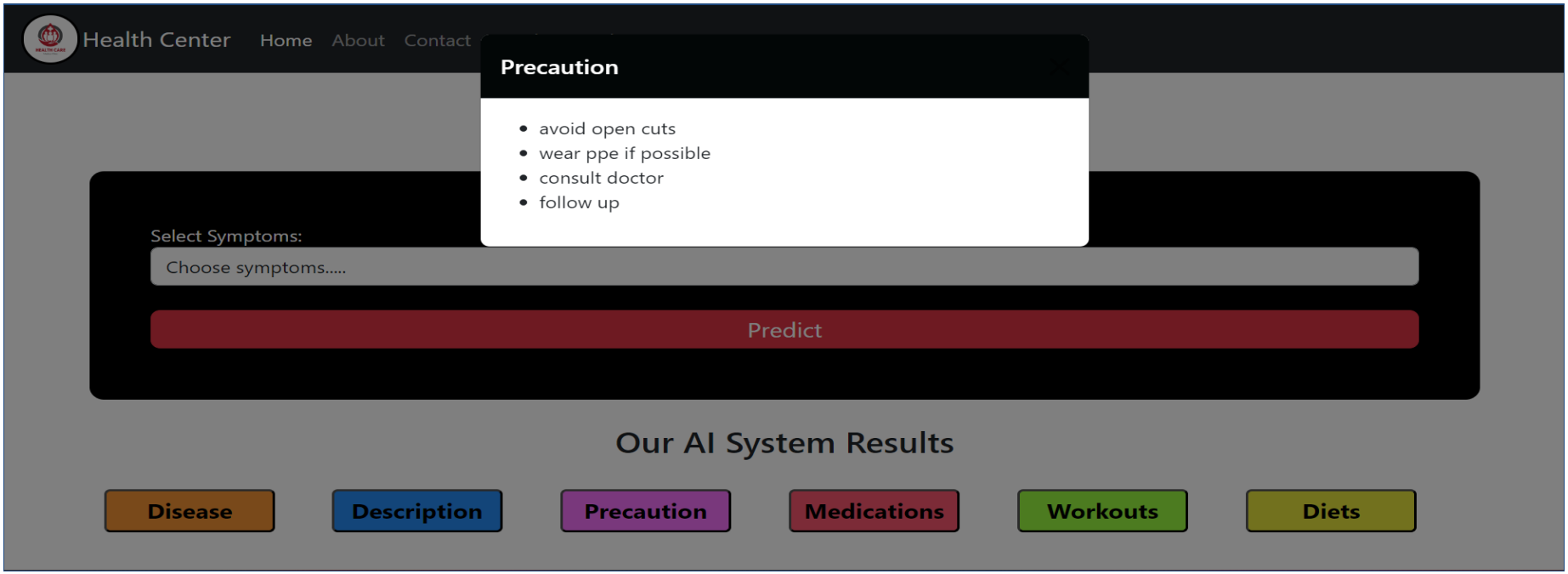
```
                    <h5 class="modal-title" id="dietsModalLabel">Diets</h5>
                    <button type="button" class="btn-close" data-bs-dismiss="modal" aria-label="Close"></button>
                </div>
                <div class="modal-body">
                    <ul>
                        {% for i in my_diet %}
                            <li>{{ i }}</li>
                        {% endfor %}
                    </ul>
                </div>
            </div>
        </div>
    </div>
    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.1/dist/js/bootstrap.bundle.min.js"
            integrity="sha384-HwwvtgBNo3bZJJLYd8oVXjrBZt8cqVSpeBNS5n7C8IVInixGAoxmnlMuBnhbgrkm" crossorigin="anonymous">
    </script>
</body>
</html>
```

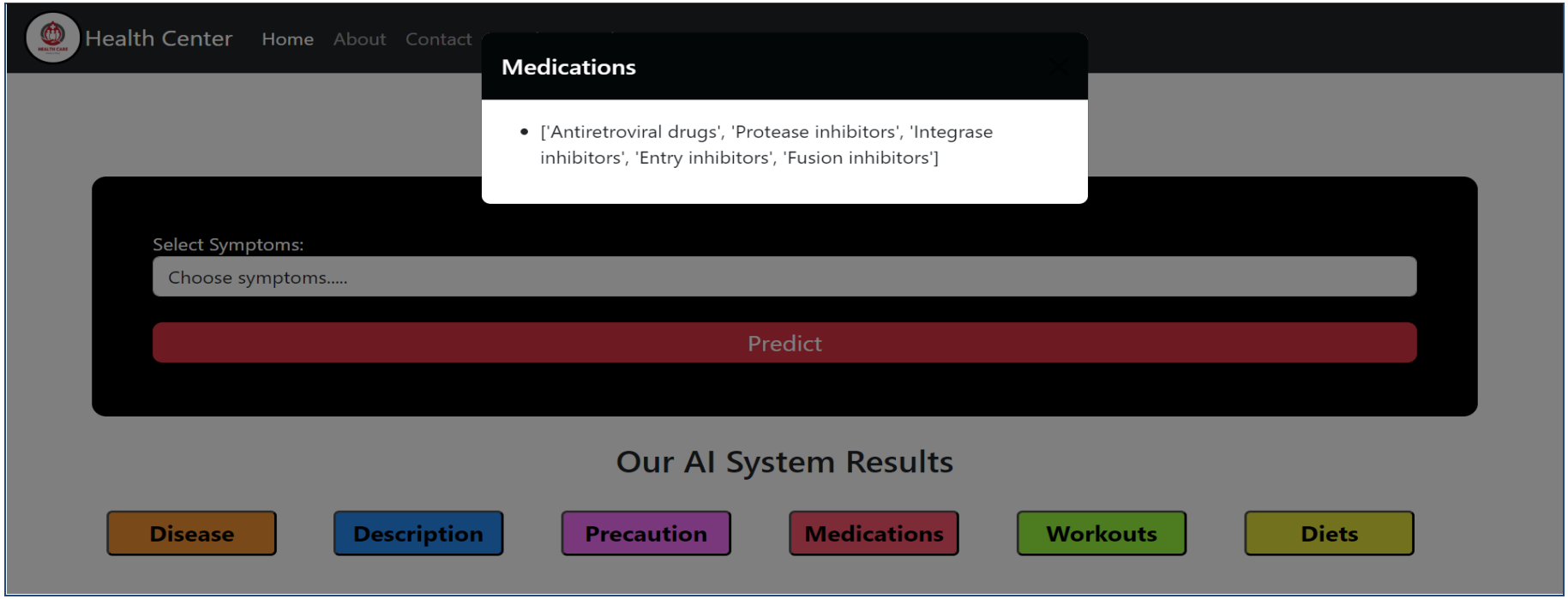
Output:

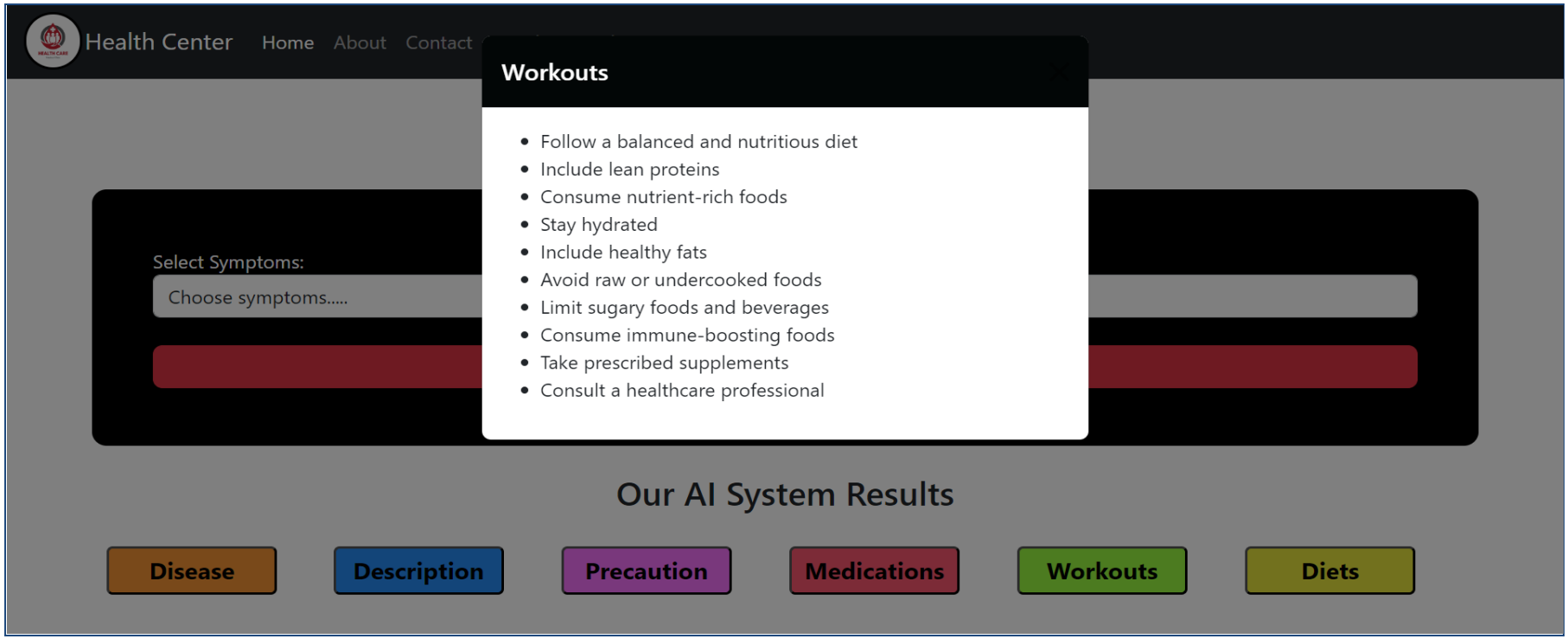

Health Center
Home
About
Contact
Developer
Blog
Health Care Center
Select Symptoms:
Extra Marital Contacts
Predict
Our AI System Results
Disease
Description
Precaution
Medications
Workouts
Diets

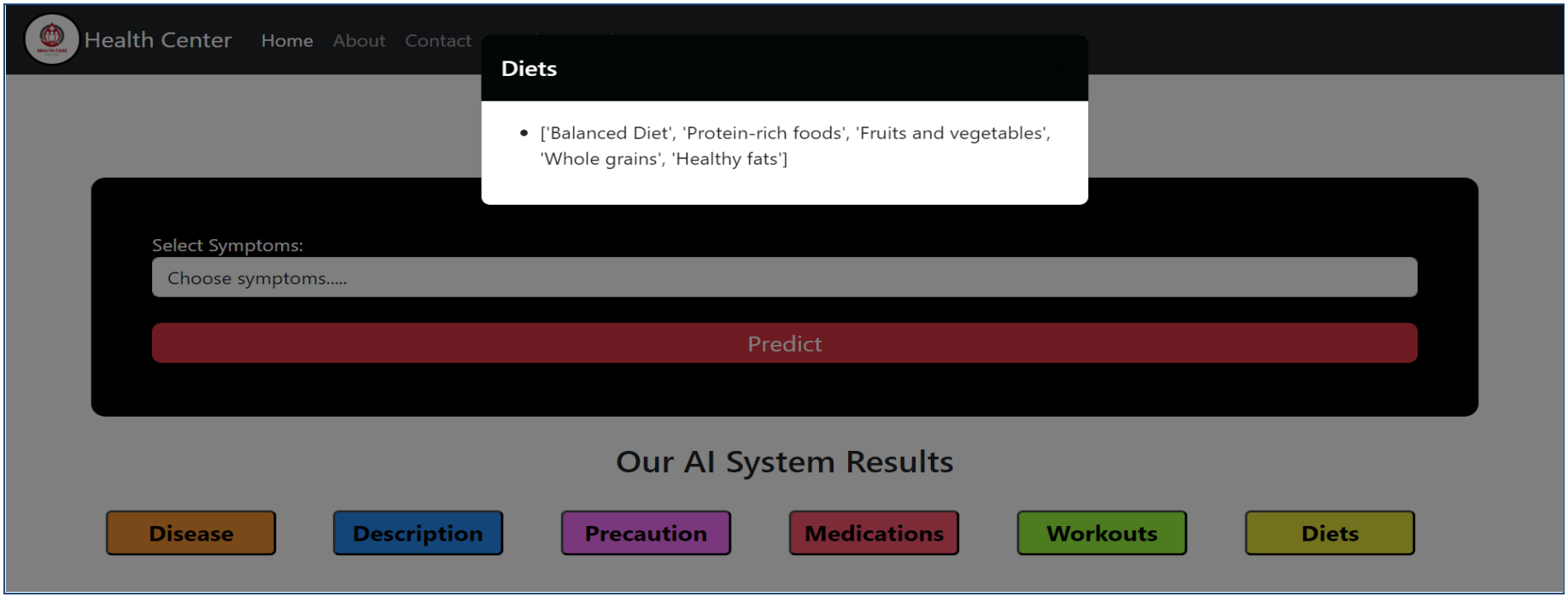

Health Center
Home
About
Contact
Predicted Disease
AIDS
Select Symptoms:
Choose symptoms.....
Predict
Our AI System Results
Disease
Description
Precaution
Medications
Workouts
Diets


Health Center
Home
About
Contact
Description
AIDS (Acquired Immunodeficiency Syndrome) is a disease caused by HIV that weakens the immune system.
Select Symptoms:
Choose symptoms.....
Predict
Our AI System Results
Disease
Description
Precaution
Medications
Workouts
Diets


Health Center
Home
About
Contact
Precaution
avoid open cuts
wear ppe if possible
consult doctor
follow up
Select Symptoms:
Choose symptoms.....
Predict
Our AI System Results
Disease
Description
Precaution
Medications
Workouts
Diets


Health Center
Home
About
Contact
Medications
['Antiretroviral drugs', 'Protease inhibitors', 'Integrase inhibitors', 'Entry inhibitors', 'Fusion inhibitors']
Select Symptoms:
Choose symptoms.....
Predict
Our AI System Results
Disease
Description
Precaution
Medications
Workouts
Diets


Health Center
Home
About
Contact
Workouts
Follow a balanced and nutritious diet
Include lean proteins
Consume nutrient-rich foods
Stay hydrated
Include healthy fats
Avoid raw or undercooked foods
Limit sugary foods and beverages
Consume immune-boosting foods
Take prescribed supplements
Consult a healthcare professional
Select Symptoms:
Choose symptoms.....
Our AI System Results
Disease
Description
Precaution
Medications
Workouts
Diets


Health Center
Home
About
Contact
Diets
['Balanced Diet', 'Protein-rich foods', 'Fruits and vegetables', 'Whole grains', 'Healthy fats']
Select Symptoms:
Choose symptoms.....
Predict
Our AI System Results
Disease
Description
Precaution
Medications
Workouts
Diets