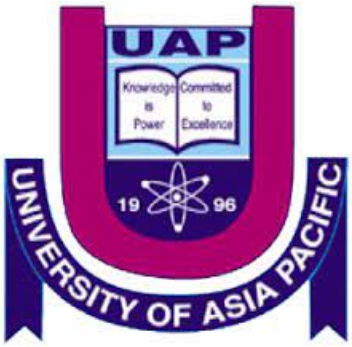

Department of Computer Science & Engineering

Course Title – Software Development
Course Code – CSE 410
Section - A2

Project Report

Project title: Multiple Disease Prediction Webapp

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Multiple Disease Prediction Webapp

Introduction

In a period of fast technological advancement and an urgent need for improved healthcare and agricultural results, the creation of a Multiple Disease Prediction System is a critical step forward in the drive for a healthier and more productive society. This revolutionary initiative uses machine learning and deep learning to forecast illnesses in humans and crops, providing diverse advantages to individuals, healthcare professionals, and farmers alike.

The Disease Prediction System's major goal is to provide a reliable and efficient method of early illness identification. Our system finds patterns and signs that may indicate the presence of a disease or the danger of its development by employing effective algorithms that evaluate user input data, medical information, and picture data. This prediction capability is intended to improve agricultural and healthcare results, highlighting the following important motivations:

1. **Improving Agriculture and Healthcare:** One of our project's most intriguing features is its potential to greatly improve agriculture and healthcare outcomes. Early illness prediction allows farmers and healthcare practitioners to adopt preventive measures, intervening before diseases progress to more severe stages. This leads to higher crop yields and lower losses in agriculture, and it can imply more effective treatment and improved patient outcomes in healthcare. We can manage and limit the impact of illnesses on both sectors if we recognize them early on.
2. **Saving Time and Money:** The Disease Prediction System addresses a significant issue that both healthcare practitioners and farmers face: the burden of time and resources. We reduce the need for manual testing and diagnosis by automating the illness prediction process, resulting in significant time and cost savings. Healthcare specialists may concentrate on treatment strategies, while farmers can discover crop illnesses quickly, limiting their influence on agricultural production. These efficiency increases not only lead to better results, but also to lower costs and greater food security.
3. **Saving Resources:** Knowing which diseases to focus on in healthcare and agriculture is critical for optimal resource allocation. We can make educated judgments about where to focus our time, money, and expertise thanks to the Disease Prediction System. This intelligent resource allocation guarantees that efforts are directed toward the most vital regions, resulting in more sustainable and cost-effective healthcare and farming solutions.

To summarize,The web-based application for multiple sickness prediction highlights the promise of technology in healthcare and agriculture by enabling early illness detection and prevention, supporting increased health, productivity, and resource efficiency.

Novelty of this work: No other site at this moment can not predict human and crop disease together by machine learning and deep learning algorithm.

GitHub Link: https://github.com/Apurba0012/multiple_disease_prediction_webapp

Background study

Disease prediction and early detection have garnered significant attention in the fields of healthcare and agriculture due to their potential to improve outcomes and resource efficiency.A complex and novel method to addressing these problems is the creation of a Multiple Disease Prediction Web Application capable of forecasting both human and agricultural illnesses. This background research delves into the approaches and algorithms used in this project, with focus on Support Vector Machines (SVM), Decision Tree, and Convolutional Neural Networks (CNN) for human illness prediction and use Convolutional Neural Networks (CNN) for crop disease prediction.

1. **SVMs (Support Vector Machines):**SVM is a strong machine learning technique that is used for classification and regression.It calculates the best potential boundary (hyperplane) for classifying data points while maximizing the margin.SVM can handle high-dimensional datasets and is successful for both linear and non-linear data.It is widely utilized in a variety of applications including as text categorization, picture recognition, and medical diagnostics.

2. **Decision Tree:**Decision Tree is a classification and regression machine learning technique.They construct a tree-like structure, with nodes representing decision points and branches reflecting potential outcomes.Decision tree is simple to understand and comprehend, making them helpful in decision support systems.They can be utilized in healthcare for symptom-based illness diagnosis and in a variety of other sectors for decision-making processes.

3. **Convolutional Neural Networks (CNN):**CNN is a deep learning system intended for picture recognition and analysis.It has several layers, including convolutional layers for extracting characteristics from pictures.CNNs are excellent at catching detailed patterns and characteristics in pictures, making them suitable for image categorization and object recognition.They are commonly employed in facial identification, medical picture analysis, and crop disease diagnosis based on visual symptoms.

Existing similar systems

"Application of recommender systems on disease recognition and treatment", ResearchGate, July 2011 suggested an idea to develop an application for disease recommender systems **[1].** "Multiple Disease Prediction Webapp", International Journal of Emerging Technologies and Innovative Research (www.jetir.org | UGC and ISSN Approved), suggested an idea to develop an application for disease recommender systems using streamlit framework **[2].** "Automated Disease Prediction System (ADPS): A User Input-based Reliable Architecture for Disease Prediction" explained the proper working of the automated disease prediction system and the working of the algorithm **[3]**. "Disease Prediction Using Machine Learning" discussed various algorithms which can be implemented for the disease prediction model. This system is used to predict most chronic diseases. It accepts the structured and textual type of data as input to the machine learning model **[4]**.We have utilized a supervised learning methodology for building the prediction model **[5]**. We have chosen classification algorithms (SVM) to build our model because they suit best disease prediction models **[6]**.”Disease Prediction using Symptoms based on Machine Learning Algorithms”suggested an idea to develop an Disease Prediction system using Symptoms **[7]**.”Prediction of Rice Disease from Leaves using Deep Convolution Neural Network towards a Digital Agricultural System”suggested an idea to develop an Disease Prediction system using image dataset **[8].**

Shortcoming of existing similar projects

Existing projects have made significant contributions to the field of illness prediction systems; yet, they frequently have limitations. These limitations prompted the creation of the "Multiple Disease Prediction Web Application," which tries to solve these problems in a comprehensive manner.

Existing projects have set guidelines for disease prediction systems, but they frequently suffer from constraints in data integration, user interface, agricultural disease prediction, algorithm selection, transparency, symptom-based prediction, and disease coverage. The "Multiple Disease Prediction Web Application" project aims to overcome these flaws by delivering a more holistic, user-friendly, and complete solution that covers both human and crop diseases.

Problem Definition

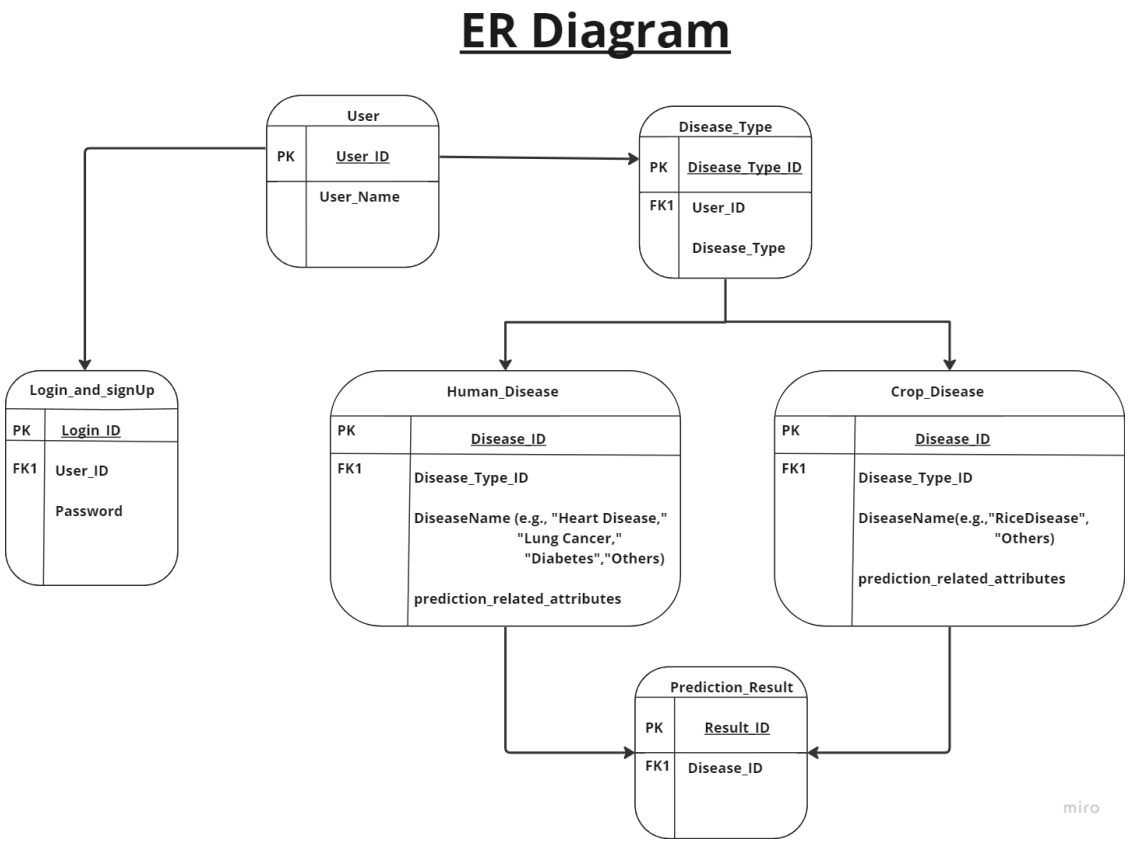
The major objective is to develop a prediction engine capable of predicting illnesses in humans and crops before they become severe. This system should assess important data and send out timely notifications to help avoid disease's impact on human health and agricultural output. The goal is to enhance disease management and safeguard both human health and agricultural yields. The goal of this project is to evaluate the supplied data, train the data using multiple techniques, and then forecast illnesses using the machine learning and deep learning models, as well as design the user interface for the same.

In summary, the project aims to transform disease management by preventing diseases before they become severe. It combines data analysis, advanced models, early detection, user-friendly interfaces, and adaptability to bring about improvements in healthcare and agriculture.

Methodology

ERD

An Entity-Relationship (ER) Diagram is a type of flowchart that illustrates how “entities” such as people, objects, or concepts relate to each other within a system. ER Diagrams are most often used to design or debug relational databases.

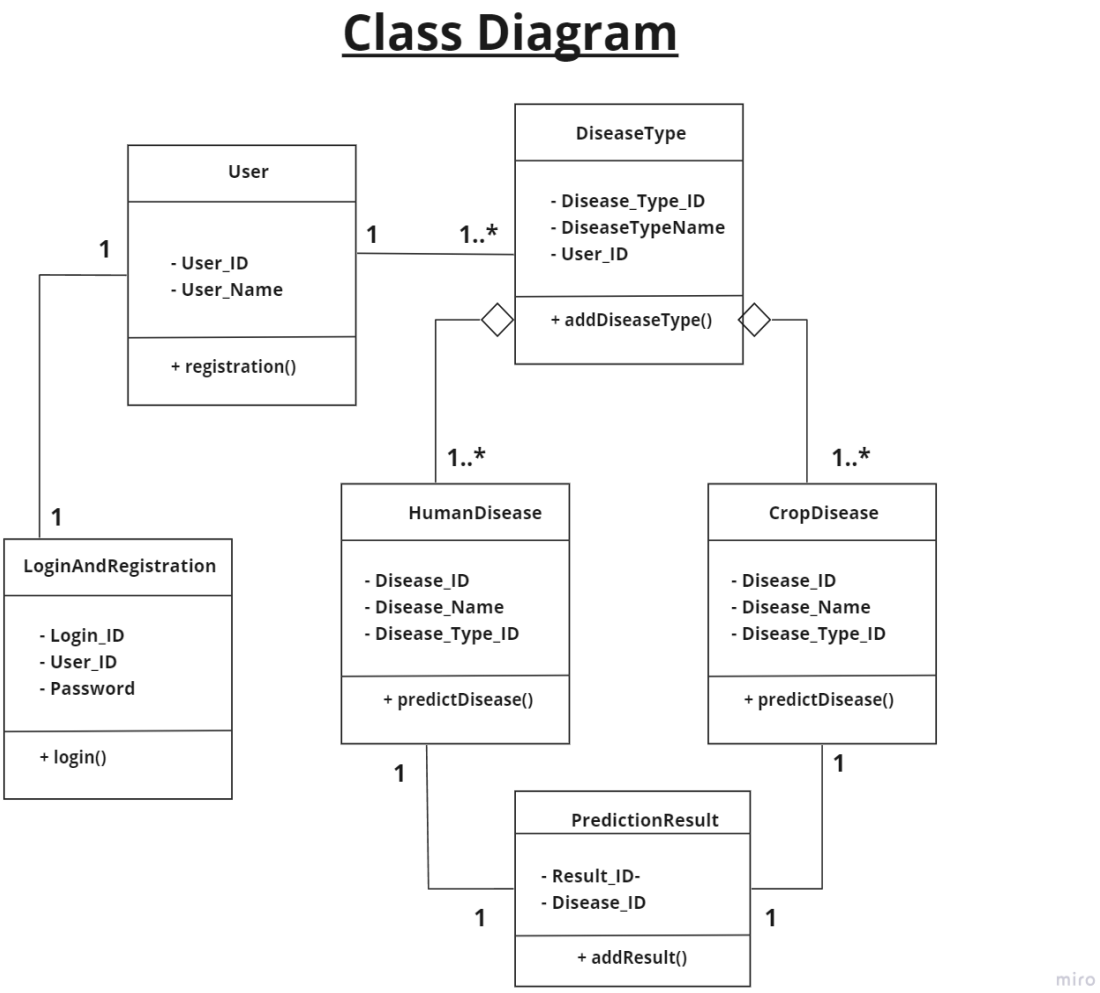


This ERD model outlines the relationships and attributes necessary for a system that handles user registration and login, user management, disease types, specific diseases (both human and crop),

and the results of disease predictions. It provides the structure for storing and managing data related to disease prediction.

Class Diagram

The class diagram is the main building block of object-oriented modeling. It is used for general conceptual modeling of the structure of the application, and for detailed modeling, translating the models into programming code. Class diagrams can also be used for data modeling.



This structured design allows the system to effectively manage user authentication, user registration, disease categories, specific diseases, and disease prediction results, facilitating early disease detection for both humans and crops while ensuring data integrity and relationships between these classes.

Cost analysis:

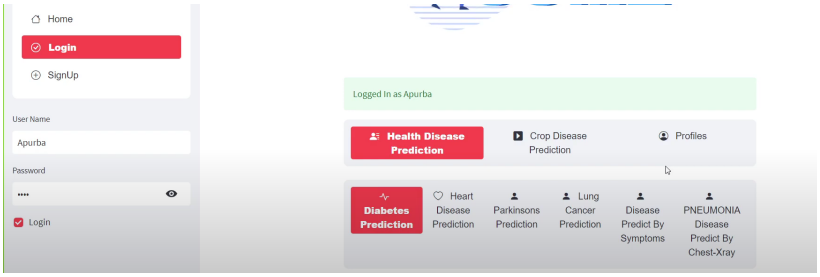
			Year 0	Year 1	Year 2	Year 3
Benefits		**Pay per use**	**0**	**500,000**	**990,000**	**1,780,000**
		Ad Monetization	**0**	**200,000**	**500,000**	**700,000**
		Sell Data	**0**	**300,000**	**600,000**	**800,000**
		Total benefits	**0**	**900,000**	**2,090,000**	**3,280,000**
Costs	**Development cost**	**Servers**	**775,000**	**0**	**0**	**0**
		Development Labor	**490,000**	**0**	**0**	**0**
	Operational costs	**Software**	**350,000**	**400,000**	**300,000**	**300,000**
		Hardware	**300,000**	**400,000**	**200,000**	**240,000**
		Operational Labor	**250,000**	**350,000**	**400,000**	**600,000**
Total costs			**2,165,000**	**1,150,000**	**900, 000**	**1,140,000**
Net Benefits =Total Benefits-Total Costs			**(2,165,000)**	**(250,000)**	**1,190,000**	**2,140,000**
Cumulative Net Cash Flow			**(2,165,000)**	**(2,415,000)**	**(1,225,000)**	**915,000**
Return on Investment (ROI)			**27.77%** **(915000/3294000)*100%**			
Break-even Point (BEP)			**1.57 years** **[1 year+(2140000-915000)/2140000]**			

Setup:

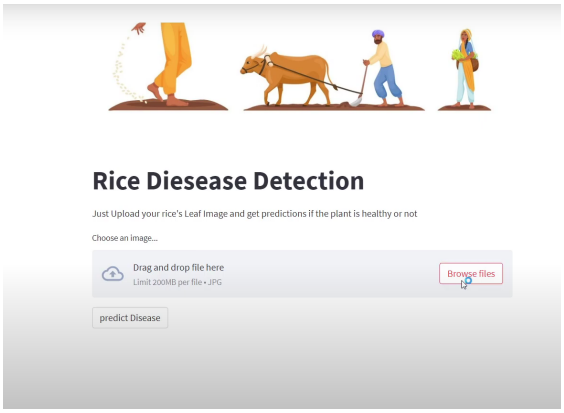
- Language: Python, HTML, CSS, Javascript
- Framework: Streamlit
- Library: python
- IDE: spyder,anaconda
- Version Control: Git & GitHub

User Manual

1. **User Interface:** The web app should have a simple and intuitive user interface that allows users to interact with the application easily.



2. **AL-based tool:** The application should have an AL-based machine learning model that can automatically predict the likelihood of a user having a certain disease based on input parameters.
3. **Input Fields:** The web app should have input fields for the user to input their personal and medical information, such as age, gender, blood pressure, and other relevant symptoms or indicators.Also take image as input to predict disease



4. **Multiple Disease Prediction:** The app should allow the user to predict multiple diseases based on their input parameters.
5. **Prediction Results:** The app should display the prediction results to the user in a clear and understandable way.
6. **Performance:** The web app should be optimized for performance, ensuring quick and accurate predictions.

Conclusion/ Future work:

This project serves as a remarkable example of how technology can revolutionize healthcare and agriculture by providing rapid and accurate disease predictions for both humans and crops. Throughout this project, you have accumulated invaluable experience in software development, web development, machine learning, and have become proficient in various technologies and frameworks, including Flask, scikit-learn, HTML/CSS/JS, and streamlit for web application development.

Here are the key takeaways and future work recommendations based on your project:

1. Project Management: Effective project management remains crucial in delivering successful projects. Ensure that you establish clear goals, timelines, and milestones, and foster effective communication among team members. For a dual-purpose application like this, it's vital to manage resources and tasks dedicated to both human and crop disease prediction modules.

2. Distributed and Collaborative Software Development: Working effectively in a distributed and collaborative software development environment is imperative. Make sure everyone on the team has access to the necessary tools and resources for both human and crop disease prediction modules. Maintain seamless communication to ensure the successful coordination of tasks for both sectors.

3. Risk Analysis:Conducting thorough risk analysis is vital for identifying potential issues early in the project. This preparation can help prevent costly delays and setbacks in the development of disease prediction systems for humans and crops.

Future Work Recommendations for Human and Crop Disease Prediction:

1. User Feedback: Collect feedback from users of both the human and crop disease prediction modules to identify areas for improvement and potential new features. Different user groups may have unique requirements, and feedback from both sectors is essential for enhancing the application's utility.

2. Integration with Other Systems: Consider integrating your Disease Prediction Web App for humans and crops with other relevant systems. For the human disease prediction module, this might involve integration with electronic medical records and healthcare databases. For crop disease prediction, integration with agricultural management and monitoring systems can provide a more comprehensive solution.

3. Machine Learning: Explore the utilization of advanced machine learning algorithms to further improve the accuracy of disease prediction for both humans and crops. Continuously update and refine the models based on new data and research findings to ensure the highest level of accuracy.

In conclusion, the development of a Multiple Disease Prediction Web App for both human and crop diseases has provided a wealth of knowledge and experience in project management, software development, and risk analysis. Leveraging this experience, you can continue to create more sophisticated software-intensive systems that contribute to both healthcare and agriculture in the future.

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Appendix A (CEP mapping)

Complex Engineering Problem & Mapping

Ks	Attributes	How K's are addressed	COs	POs
K3	Engineering fundamentals	Data collection, Python, Machine Learning, Deep Learning	CO1	PO(a)
K4	Specialist knowledge	Steamlit framework, Machine learning model (Support Vector Machine, Logistic Regression model)	CO1	PO(a)
K5	Engineering Design	UML, MVC, Agile methodology, UI/UX Design.	CO3	PO(c)
K6	Engineering practice	Pycharm, Anaconda, Pandas, numPy, Streamit, Python libraries for Machine Learning (Logistic Regression, Decision Tree, CNN)	CO4	PO(e)

Ps	Attributes	How P's are addressed	COs	POs
P1	Depth of knowledge required	Requires knowledge about Streamlit for developing the web app. (K4) Project requires UML and MVC framework for designing, Agile methodologies to design and analyze the whole project. (K5) We need to have proper knowledge about Machine Learning models such as Linear Regression, SVM, Decision Tree, CNN.	CO1 CO3	PO(a) PO(c)
P3	Depth of analysis required	The project requires studying more SVM and CNN models. Also more knowledge about Logistic Regression and Decision Tree is required.to make the prediction system more accurate.	CO2 CO8	PO(b) PO(j)

P7	Interdependence	• Data collection and processing • ML and DL model development • Model deployment and prediction system • Model Accuracy Testing • Developing WebApp.	CO3 CO7 CO8	PO(c) PO(i) PO(j)

As	Attributes	How A's are addressed	COs	POs
A1	Range of resources	The project needs various medical data and other information and technologies.	CO4 CO6	PO(e) PO(h)
A4	Consequences for society and environment	Our work helps the people to obtain an immediate result of disease type hence helps them to take proper medication in time.	CO5	PO(f)

How COs are addressed through the Project:

Ps	CO Statement	Corresponding POs
CO1	Identifying a real-life problem that can be transmitted to an engineering or computing solution through design, development and validation.	PO(a) PO(d)
CO2	Identify, formulate, and analyze a real world problem based on requirement analysis.	PO(b) PO(c)
CO4	Use modern development tools which are popular among s/w developers.	PO(e)
CO6	Practice professional ethics and responsibilities and norms of engineering practice.	PO(h)
CO7	Work as a team and fulfill individual responsibility.	PO(i)
CO8	Communicate effectively through presentation and write effective reports and Documentations on the project.	PO(j)