



Gluco-Sense AI

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Introduction

- Diabetes is a chronic disease needing early detection to prevent complications.
- The project proposes a Diabetes Prediction System using machine learnings
- It analyzes health data to identify individuals at risk of diabets.
- If the result is positive, it offers an option to book a doctor's appointment.
- This ensures timely consultation and improved healthcare support.



Abstract

- Diabetes is a major global health concern that often goes undetected until complications arise.
- The project introduces a Diabetes Prediction System using machine learning to analyze patient health data.
- It predicts the risk of diabetes based on health parameters.
- If the result is positive, the system provides an option to book a doctor's appointment for timely consultation.
- By combining prediction with healthcare access, the system promotes early diagnosis and preventive care.



Scope

- Develop a machine learning-based system to predict diabetes risk.
- Analyze patient health data for accurate predictions.
- Allow users to book doctor appointments if at risk.
- Focus on prediction and consultation facilitation.
- Promote early diagnosis and preventive healthcare.



Objective

1. Predict diabetes using machine learning.
2. Allow users to input health data easily.
3. Provide instant prediction results.
4. Enable doctor booking for positive cases.
5. Design a simple, accessible interface.

FEASIBILITY STUDY

1. Technical Feasibility

- Prediction System
- Data Storage
- Booking system

2. Economic Feasibility


- Development Cost
- Monetization (Future)



3. Operational Feasibility

- Usability
- Maintenance
- Integration

4. Legal and Ethical Feasibility

- Privacy Laws
 - Data Handling
 - Prediction Ethics
 - Doctor Booking
 - Consent
- 

5. Time Feasibility

- MVP Timeline
- Time Buffer



Existing system -Pros

- Clinically Validated
- No Dependency on Historical Data
- Minimal Technological Infrastructure Needed

Existing system -Cons

- No Early Prediction Capabilities
- Costly Over Time
- Limited Use of Big Data
- Requires Human Interpretation
- no immediate result

Proposed system -Pros

- Early Prediction & Prevention
- Fast
- Cost-Effective Over Time
- Non-Invasive

Proposed system -Cons

- Data Quality Dependency
- Not a Replacement for Diagnosis
- False Positives or Negatives
- Limited Clinical Trust

LITERATURE REVIEW

Sl no	Author(s)	title/focus	key features	year
1	KM Jyoti Rani	Diabetes Prediction Using Machine Learning	Machine Learning, Diabetes, Decision tree, K nearest neighbour,	2020
2	felix ulfred, Mitchell starc, Mitchell Johnson	Diabetes prediction using machine learning and explainable AI	Dataset Composition,Feature Selection,Insulin Prediction,Class Imbalance Handling	2023
3	Nazin Ahmed, Rayhan Ahammed	Machine learning based diabetes prediction and development of smart web application	Flask, Accuracy, Random Forest (RF), Support Vector Machines (SVM),Logistic regression (LR),Gradient boosting (GB), k-nearest neighbor (k-NN)	2021

LITERATURE REVIEW

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4	Caelib van, jasper john	Research on Diabetes Prediction Method Based on Machine Learning	Dataset Composition,Feature Selection,FlaskAccuracyRandom Forest (RF)Support Vector Machines (SVM)	2020
5	Khaled Alno	Smart Diabetes Prediction System Using Machine Learning Algorithms	KNN Imputation for Missing Data Handling,Tri-Ensemble Voting Classifier Model, Comparison with Multiple ML Algorithms,High Performance Metrics (Accuracy, Precision, Recall, F1 Score)	2024
6	N Kushal Kumar Raju, Keshav Krishnamurthy, Prahal Bhagavath	Diabetes Prediction Using Machine Learning and Flask	Ensemble; KNN; Logistic Regression; Machine learning; Random Forest; SVM	2024

SYSTEM SPECIFICATION

Front End

- HTML5 - A markup language used for structuring and presenting hypertext documents on world wide web.
- CSS 3 - The language used to style HTML elements on a Webpage
- JavaScript - A lightweight programming language used to add dynamic and interactive behavior to website.
- Bootstrap – a free and open-source front-end framework that help developers quickly build responsive and mobile-first websites.

SYSTEM SPECIFICATION

Back End

➤ Python flask and Fast API- Flask and FastAPI are lightweight and easy to integrate with ML models

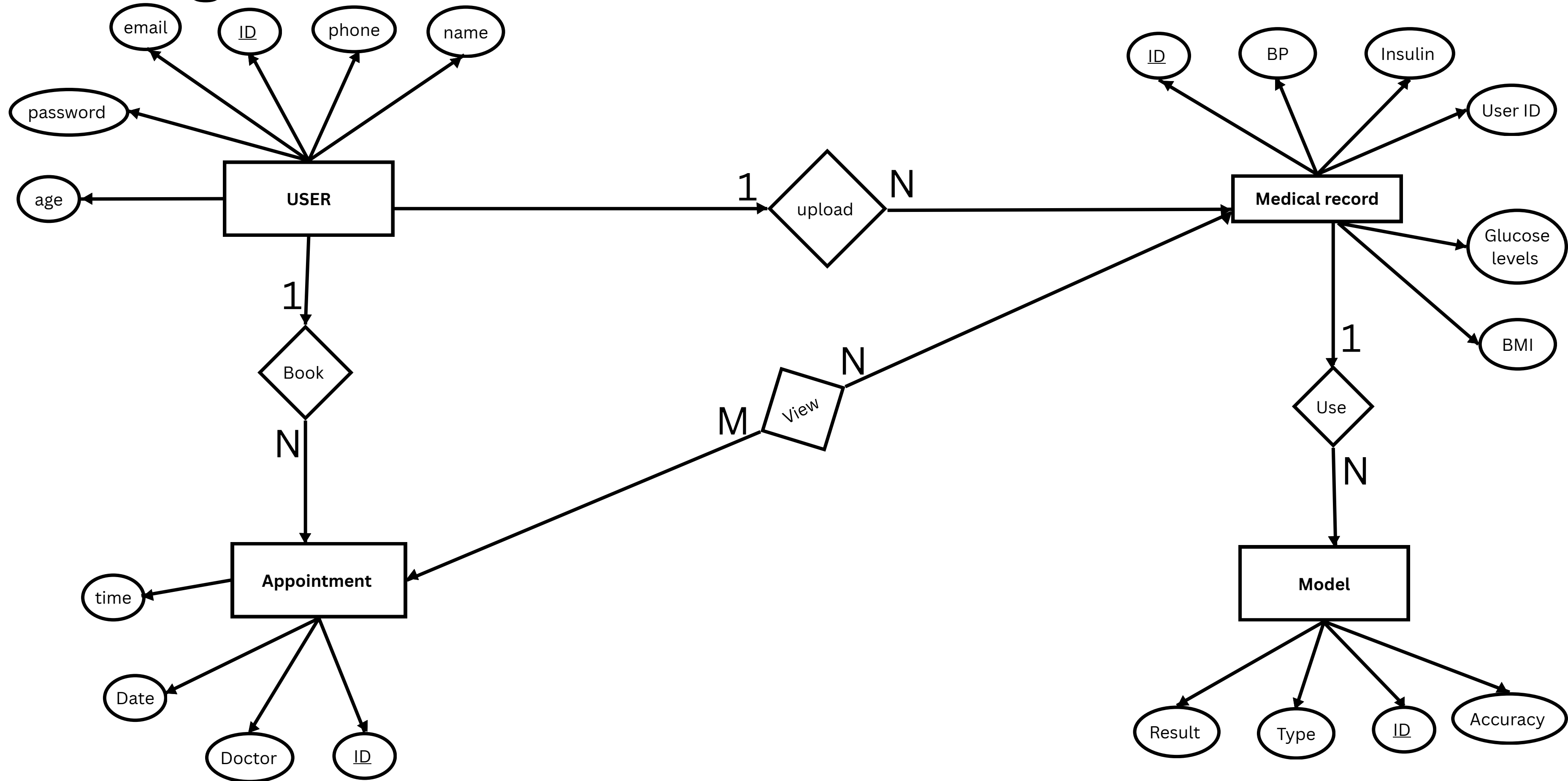
Database

➤ MySQL – A relational database management system (RDBMS) developed by Oracle that is based on structured query language(SQL).

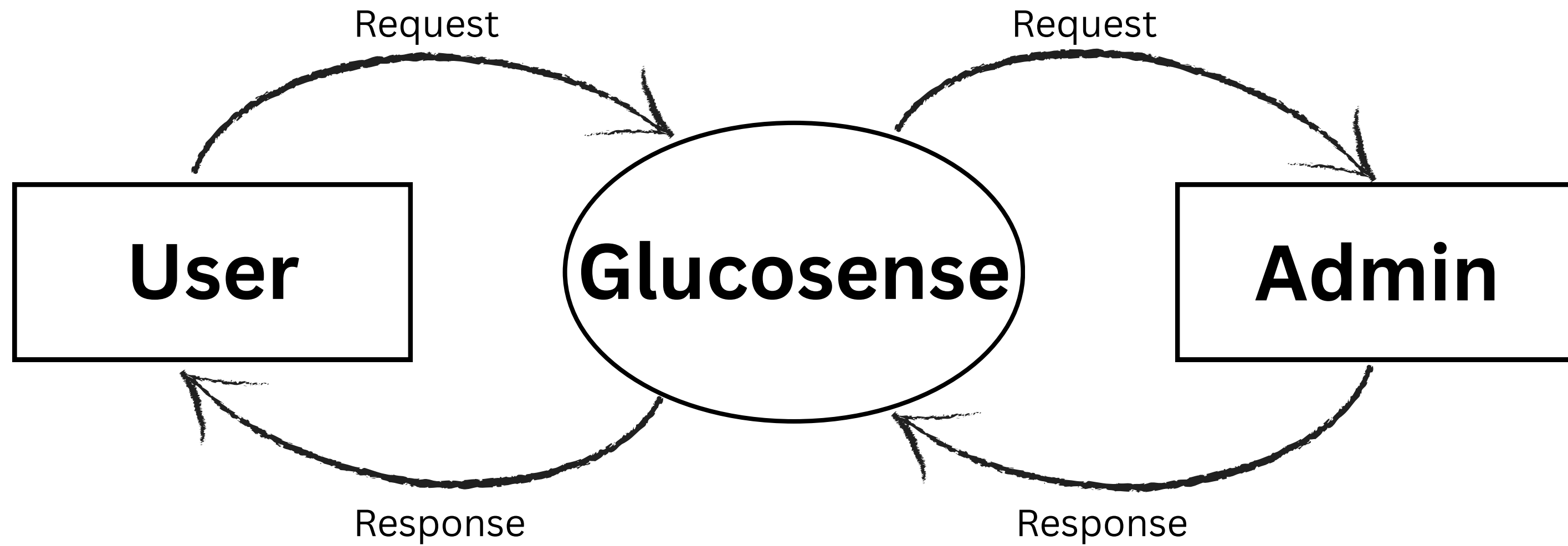
MODULES

- **User module**
- **Admin module**

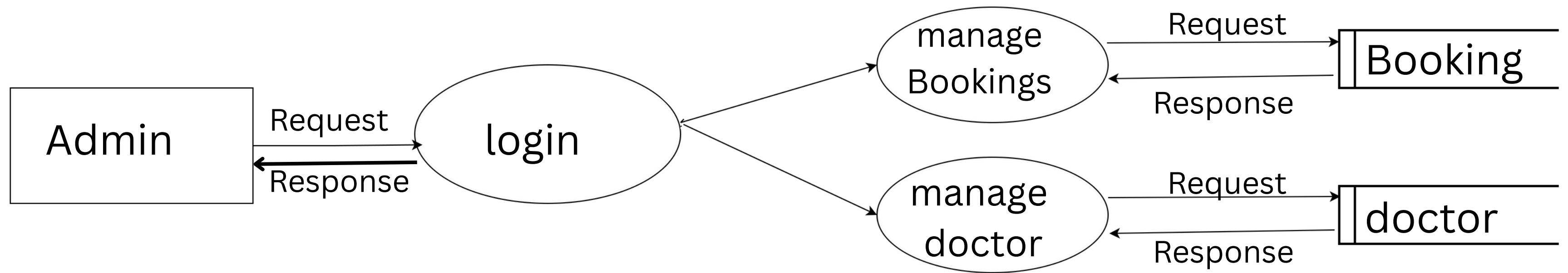
ER diagram



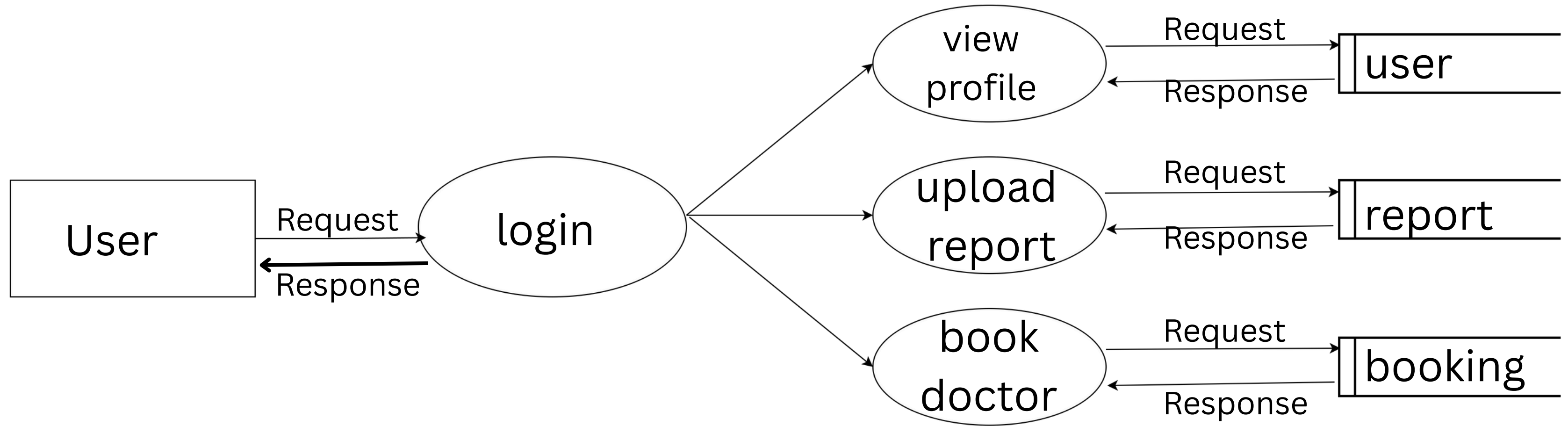
DFD - Level 0



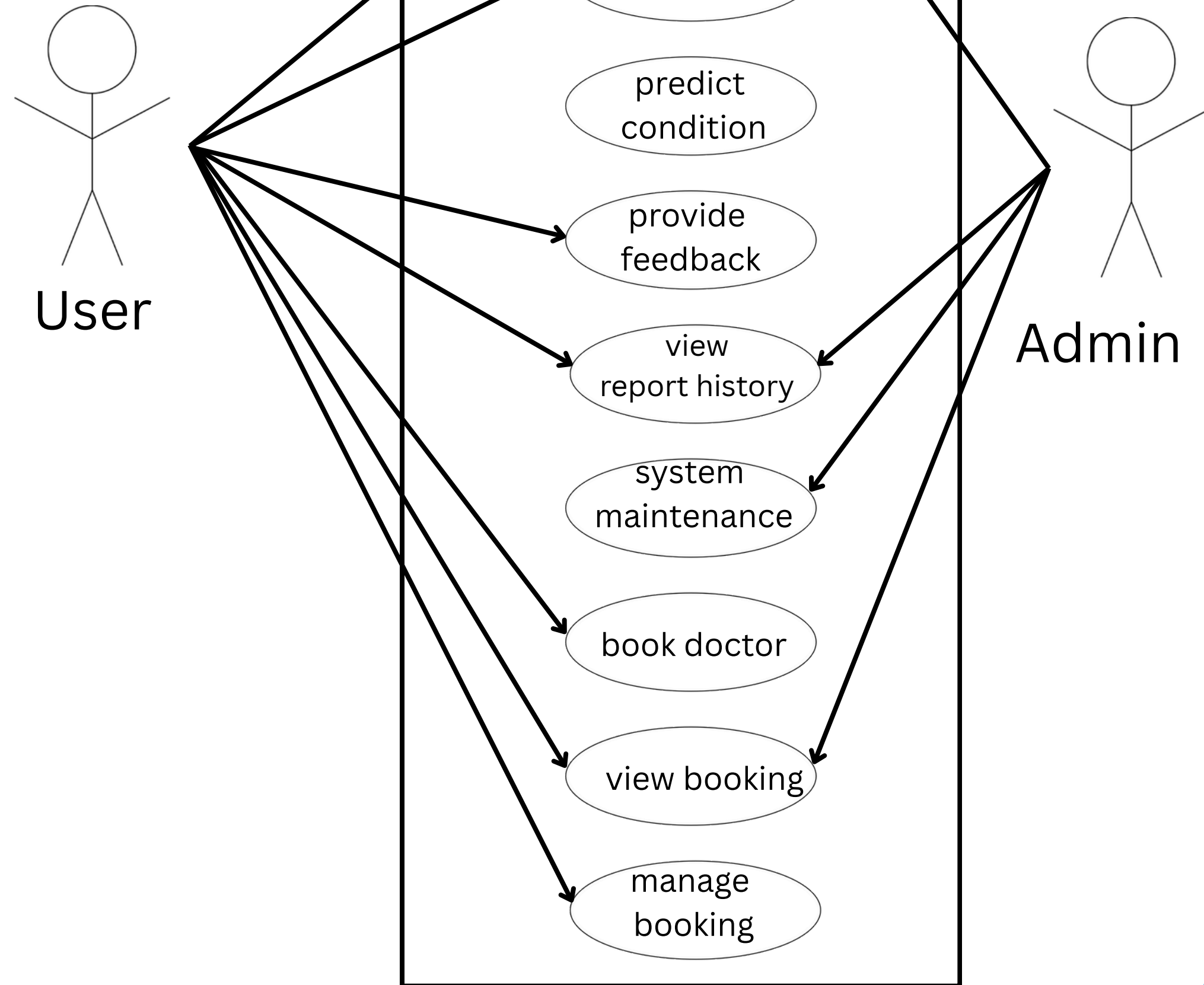
DFD - Level 1: ADMIN



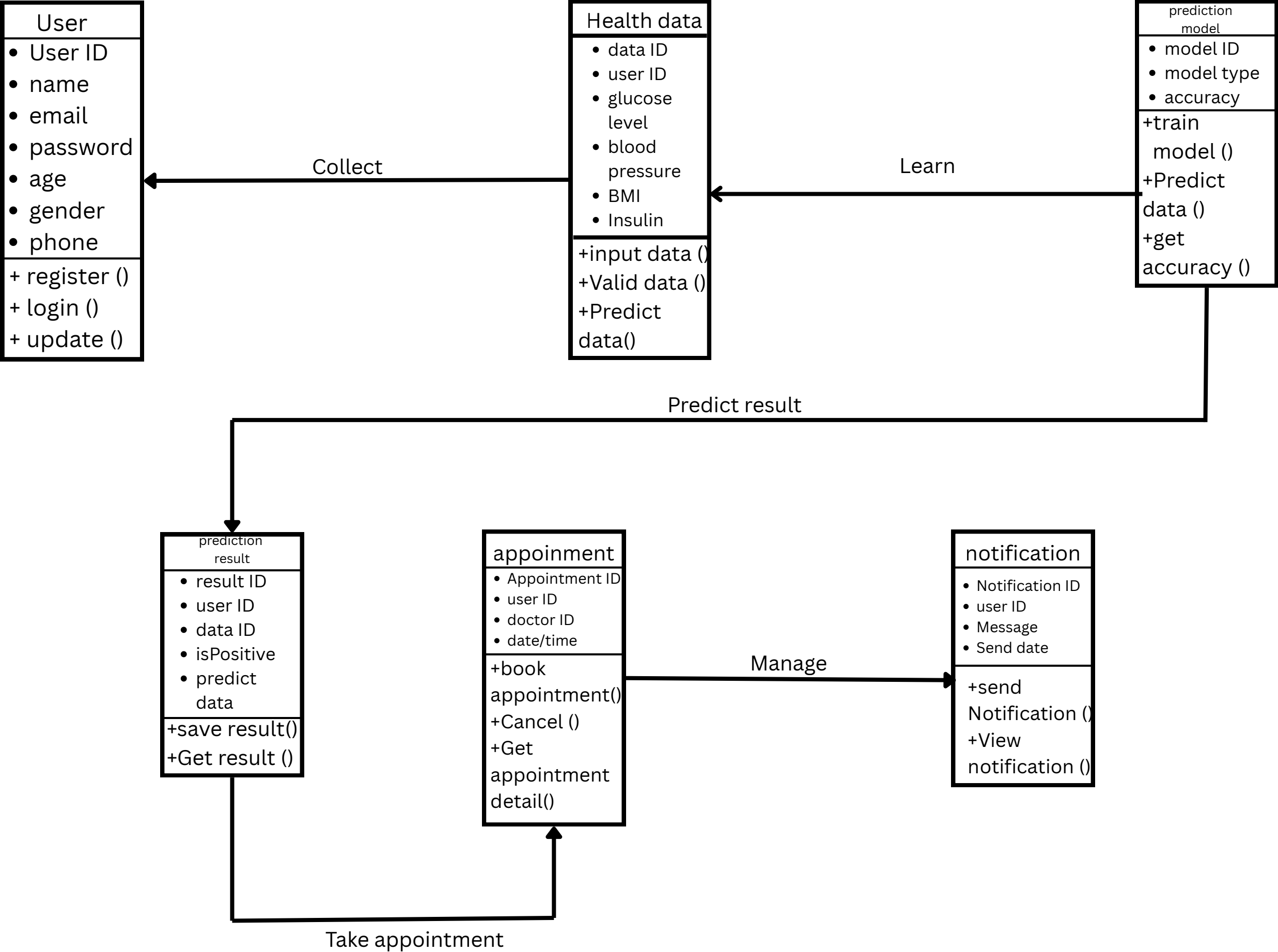
DFD - Level 1: USER



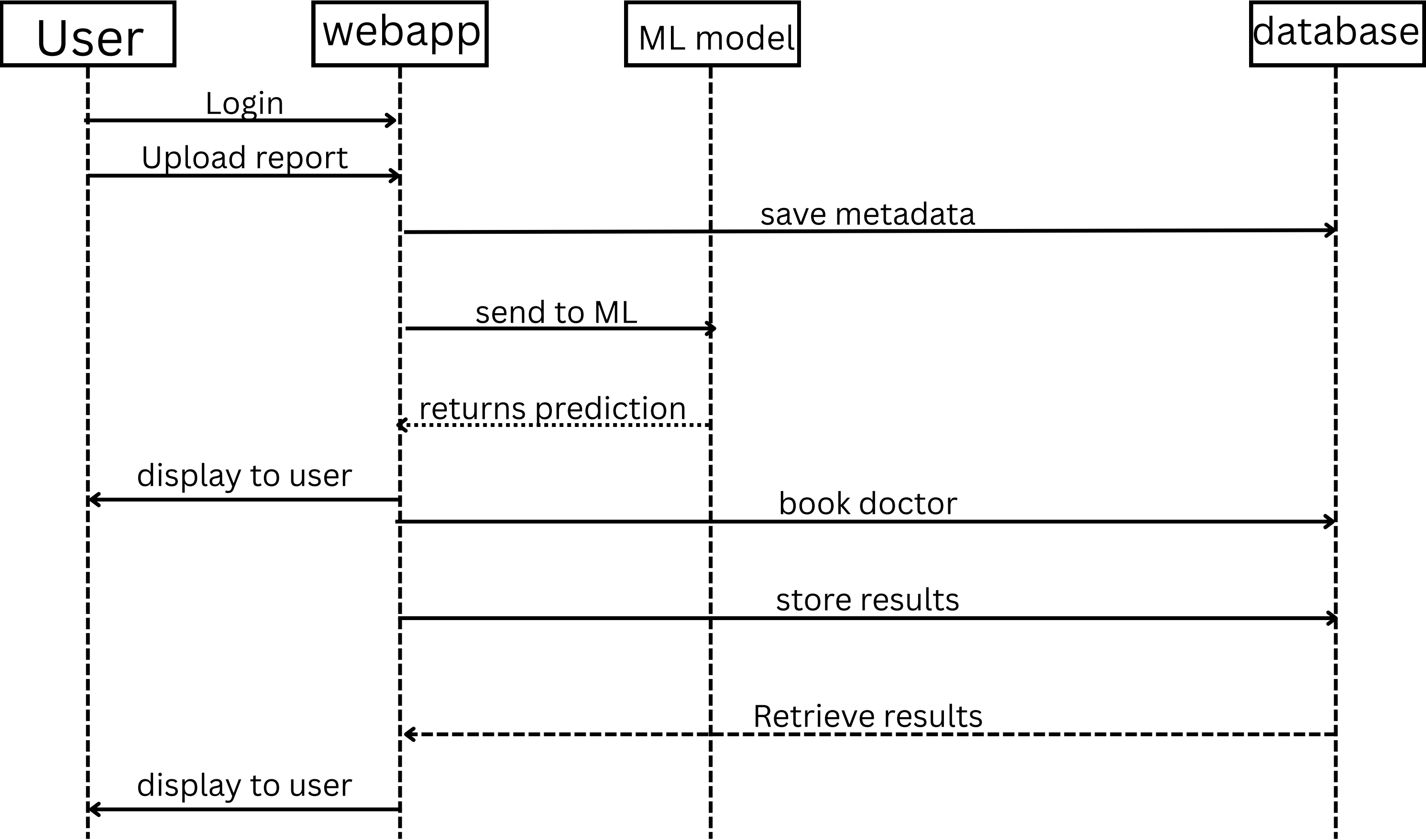
Use case diagram



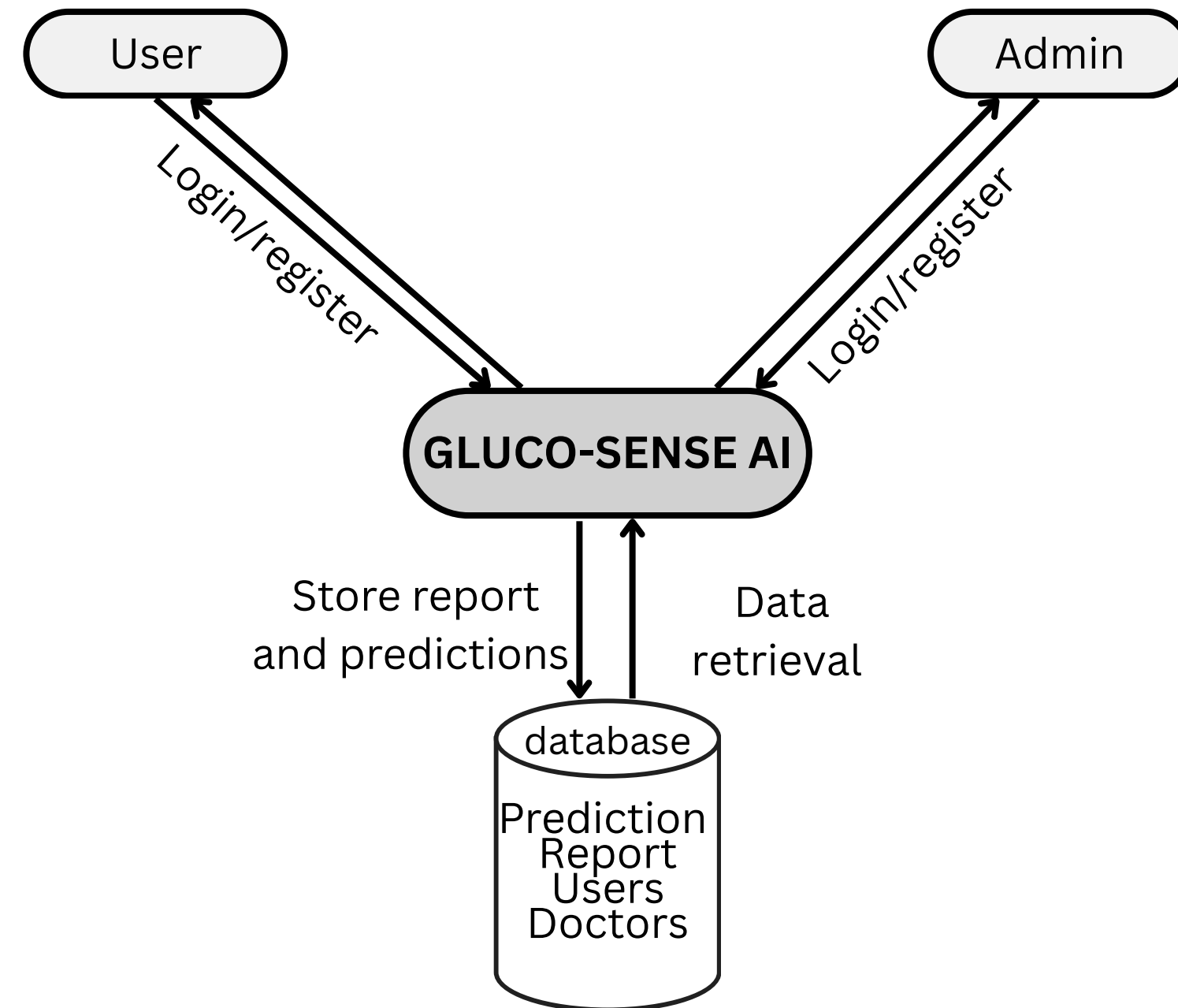
Class diagram



Sequence diagram



System architecture



Demo video

Result Analysis

The GlucoSense system was evaluated using a dataset of medical parameters such as glucose level, BMI, insulin level, age, and blood pressure.

After preprocessing and training machine learning models (e.g., Logistic Regression, KNN, Random Forest or SVM), the system achieved the following indicative performance metrics:

Algorithm	Accuracy (%)	Precision	Recall	F1-Score
Logistic Regression	77.5	0.79	0.75	0.77
SVM	79.0	0.81	0.77	0.79
KNN	75.8	0.76	0.74	0.75
Random Forest	84.2	0.86	0.83	0.84

The Random Forest model provided the best balance between accuracy and interpretability.

Conclusion

- GlucoSense accurately predicts diabetes risk using ML.
- Enables early diagnosis and preventive action.
- Connects users directly with doctors booking system.
- Encourages awareness of preventive healthcare.
- Can evolve into a complete digital health assistant.

Future Scope

- Additional health parameters and larger datasets
- Multi-disease prediction
- Mobile application
- AI-based chatbots

References

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2. Han, J., Kamber, M., & Pei, J. (2012). *Data Mining: Concepts and Techniques*. Morgan Kaufmann Publishers.
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5. Patel, H., & Prajapati, P. (2021). Diabetes Prediction Using Machine Learning Techniques. *Proceedings of the International Conference on Computing, Communication and Automation (ICCCA)*, IEEE.
6. Xu, Y., Zhang, X., & Wang, J. (2022). An Intelligent Diabetes Prediction System Using Hybrid Machine Learning Models. *IEEE Access*, 10, 65432–65445.



Thank you