HealthGuard: Diabetes Prediction

A Machine Learning and Expert System Approach

Submitted by:

Your Name / Team Members

Date: November 2024

Table of Contents

1. Overview

2. Objectives

3. Dataset Details

4. Machine Learning Model and Evaluation

5. Expert System Design

6. GUI Application

7. Outputs and Reasoning

8. Conclusion

9. References

HealthGuard: Diabetes Prediction

1. Overview

The HealthGuard project is designed to predict the likelihood of diabetes using machine learning and expert system reasoning. This project aims to provide an accessible and user-friendly tool for early diabetes risk assessment.

2. Objectives

The primary goal of this project is to assist users in identifying diabetes risk factors based on their personal health data. The project aims to combine predictive capabilities of a machine learning model with reasoning provided by an expert system.

3. Dataset Details

The Pima Indians Diabetes dataset contains 768 instances with 8 medical attributes such as glucose level, blood pressure, BMI, and diabetes pedigree function. This dataset is a standard benchmark for diabetes-related studies.

4. Machine Learning Model and Evaluation

The Random Forest Classifier was used to predict diabetes outcomes. The dataset was preprocessed with scaling and splitting into training and test sets. The model achieved an accuracy of 78.00%. Below is the classification report:

Precision:0.80

Recall: 0.72

F1-Score: 0.76

5. Expert System Design

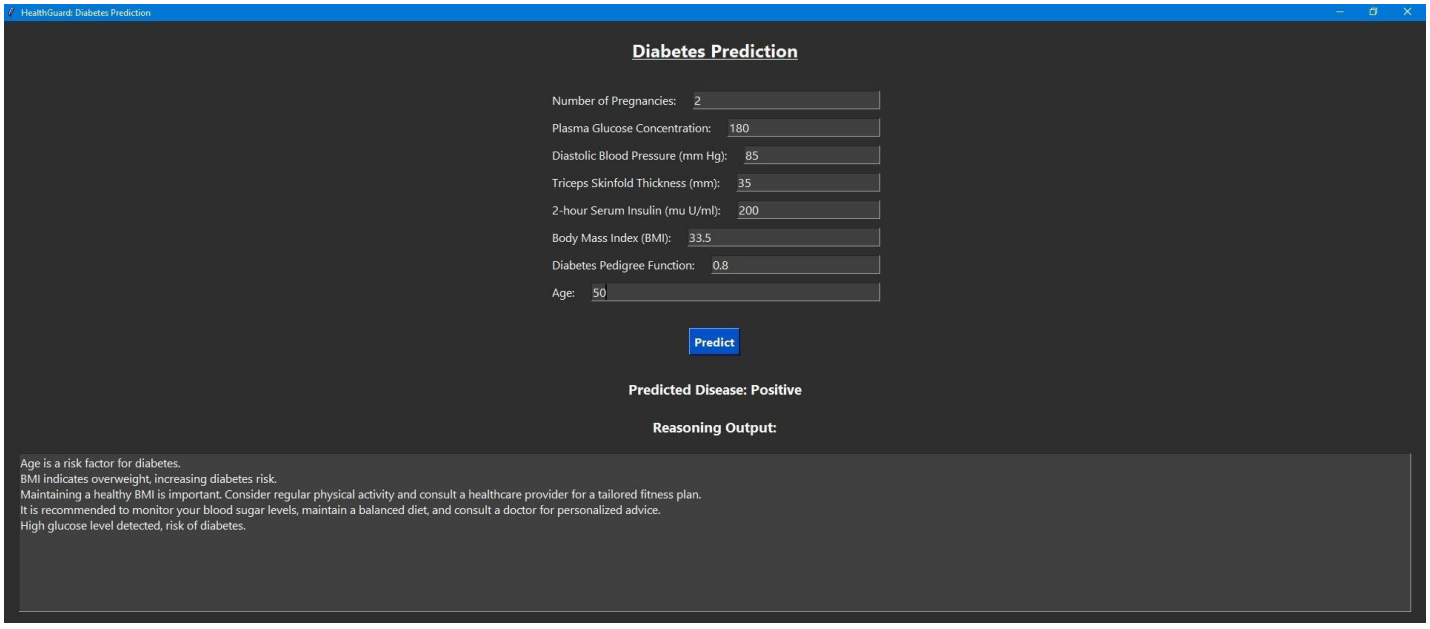
The expert system uses rules to provide reasoning for diabetes risk. For example, high glucose levels, BMI above 30, and age over 45 are considered significant factors. The reasoning is displayed to the user along with the prediction.

6. GUI Application

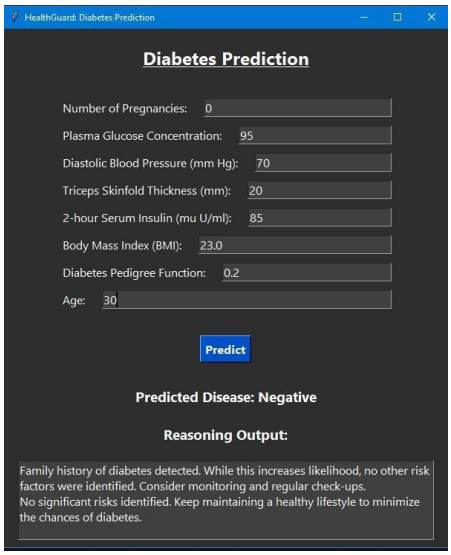
The GUI, built using Tkinter, provides an intuitive interface for users to input their data and receive predictions along with reasoning. Inputs include glucose levels, BMI, age, and more.

7. Outputs and Reasoning

Below are example outputs from the application showing predictions for positive and negative cases along with detailed reasoning:



HealthGuard: Diabetes Prediction



8. Conclusion

The HealthGuard project demonstrates how machine learning and expert systems can be used together to provide accurate and interpretable predictions for diabetes risk. Future improvements could include expanding the dataset and enhancing the reasoning rules.

9. References

- Pima Indians Diabetes Dataset
- Scikit-learn for Random Forest Model
- Experta for Expert System Implementation
- Tkinter for GUI Development