An analysis and machine learning project by **B.Nedyalkov**

Diabetes

Statistics and insights of diabetic patients (Pima native American women)

With dataset supplied by Akshay D.
(https://www.kaggle.com/datasets/akshaydattatraykhare/diabetes-dataset)
National Institute of Diabetes and Digestive and Kidney Diseases

Overview

Diabetes dataset

The data consists of:

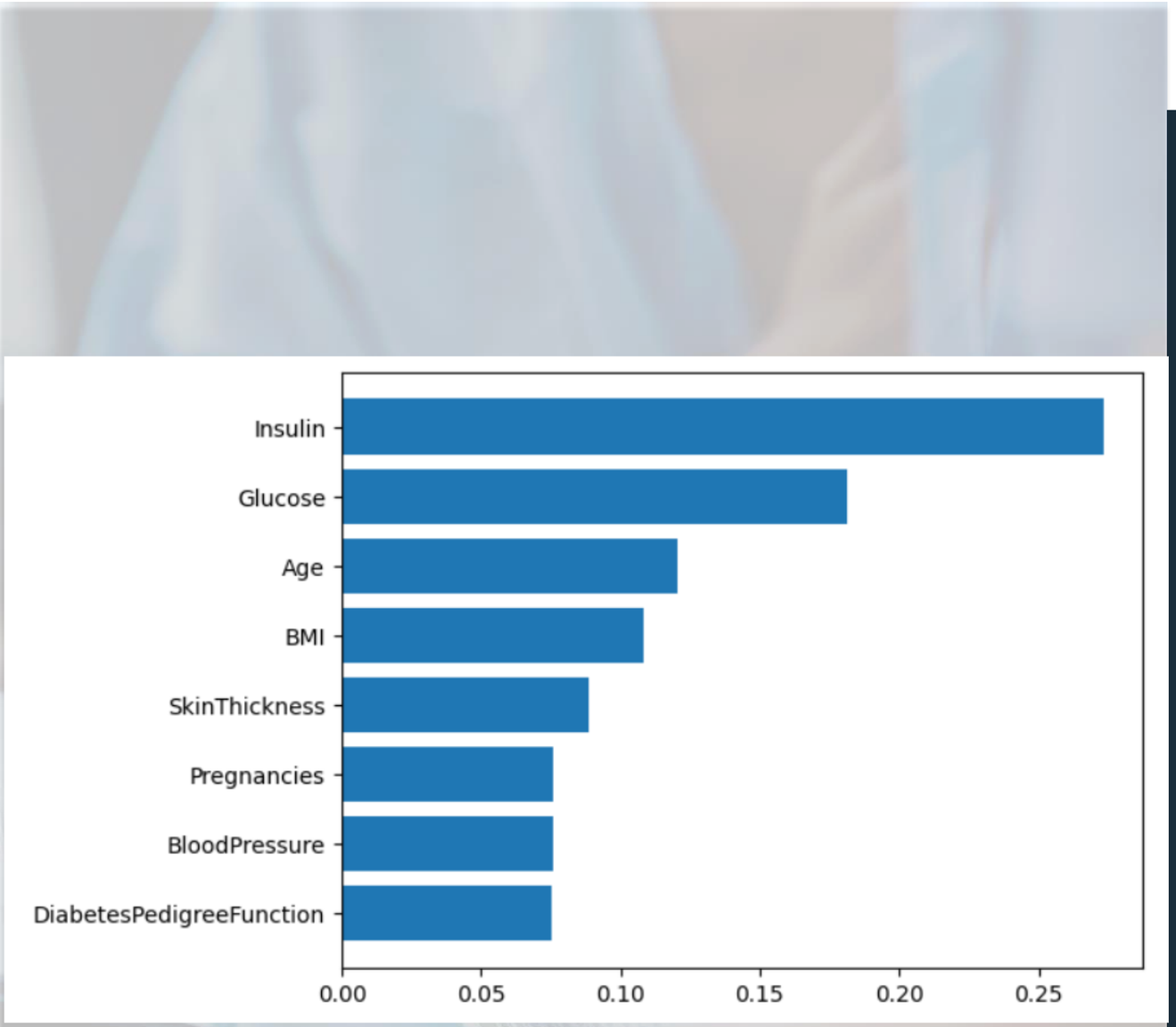
- The of **clinical parameters** (Blood glucose, age, BMI, etc.)
- Of **768 women**
  - 268 of whom with type II diabetes
  - 500 without
- From **Pima Indian heritage**

Diabetes type II is a disease that stops the body from using insulin properly

Overview

Diabetes facts

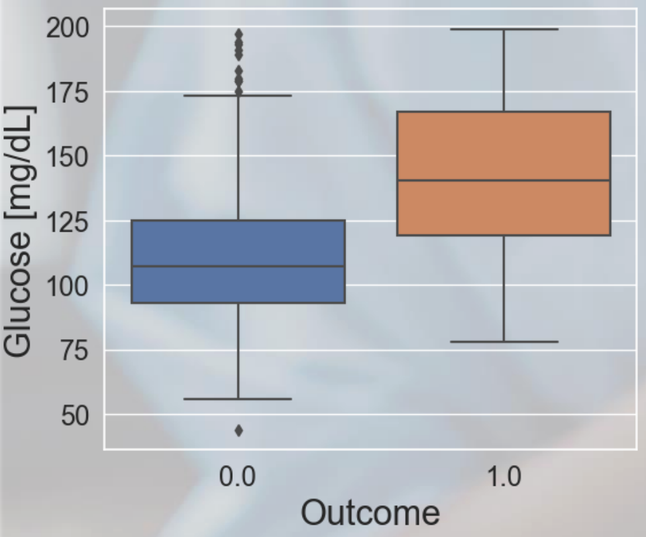
- Over time, type 2 diabetes can cause serious damage to the body, especially nerves and blood vessels
- Type 2 diabetes is often preventable
- Diabetes is a risk factor for many diseases and health complications
- It is the leading cause of blindness and amputation in adults
- Diabetics have at least 2 times the medical costs of someone without diabetes

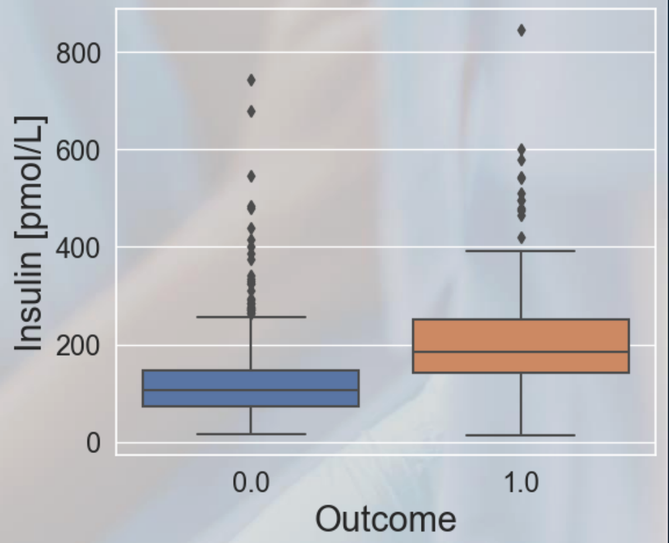


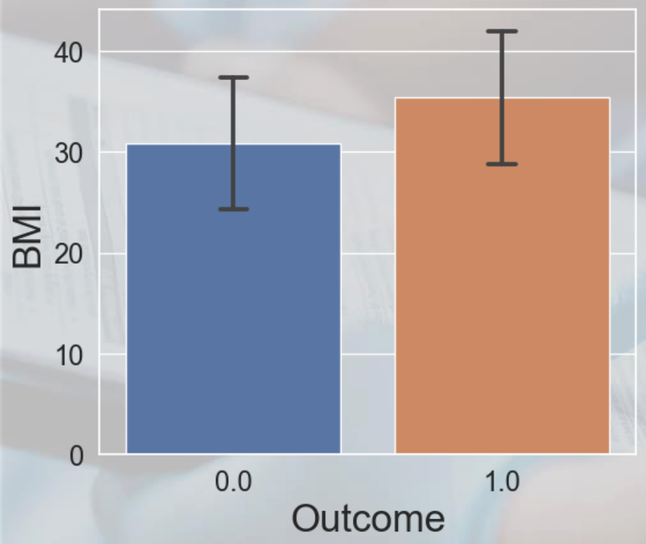
Analysis of the Data

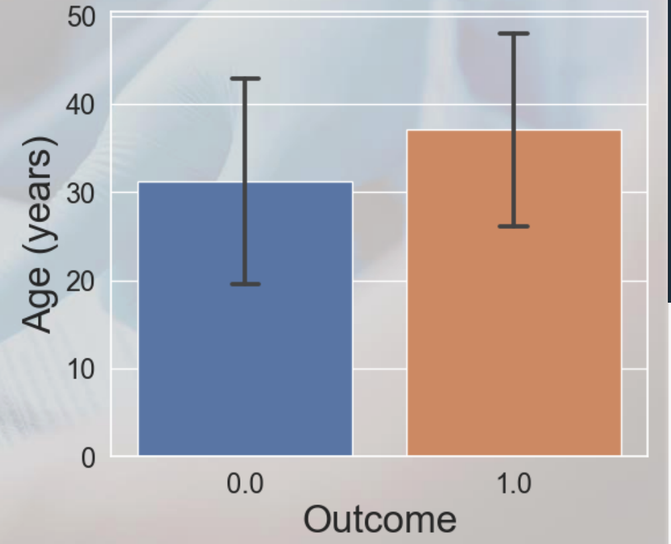
Most important factors

- BMI
- Insulin levels
- Glucose levels (Blood sugar)
- Age







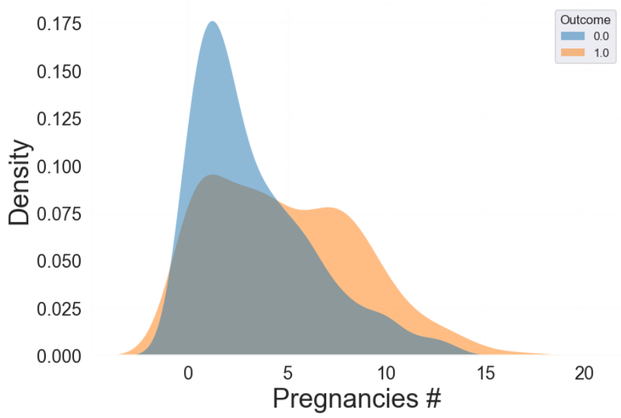


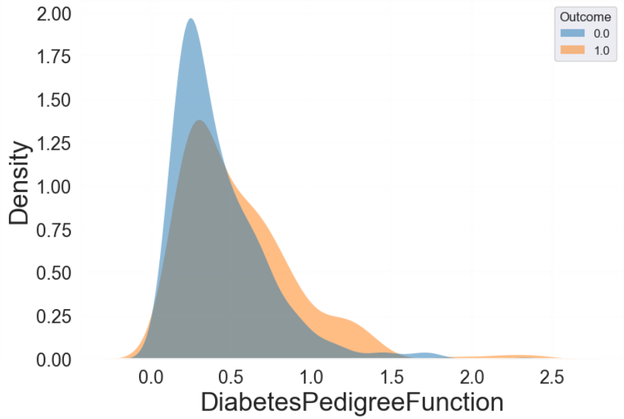
Analysis of the data

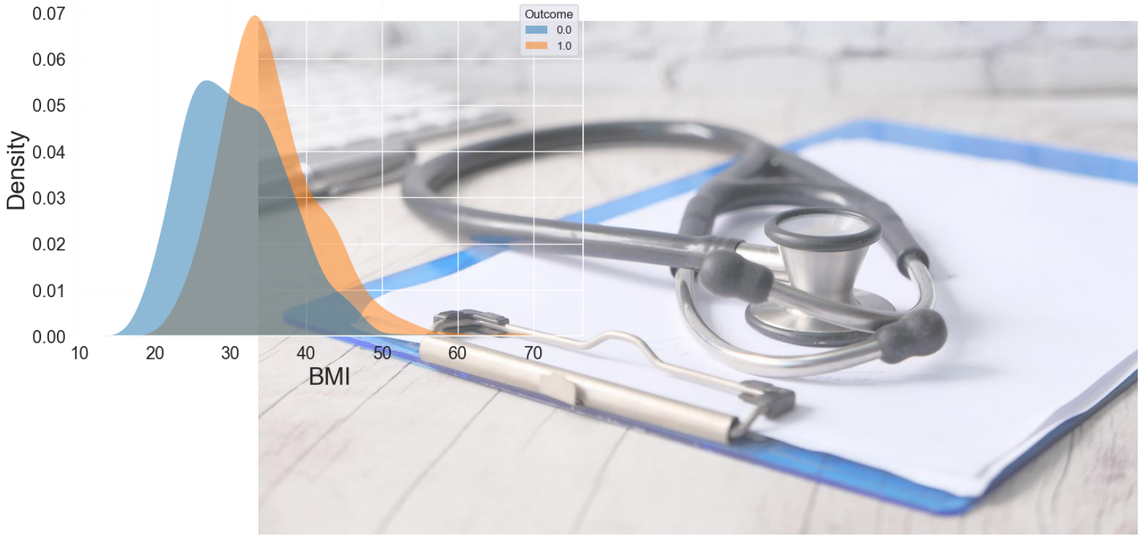
Most important factors

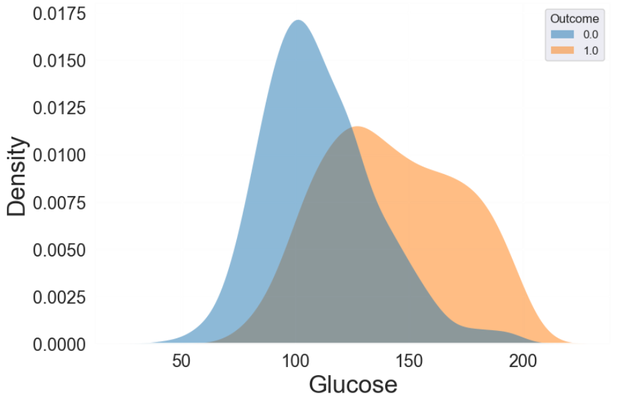
- BMI
- Insulin levels
- Glucose levels (Blood sugar)
- Age

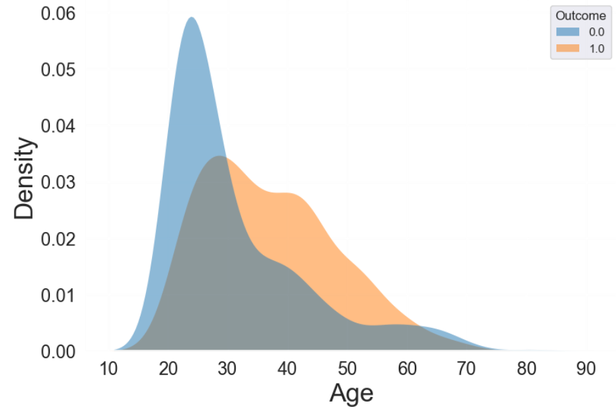
0 = No Diabetes
1 = Has Diabetes











Distributions of the data

Analysis of the data

Insights from the data

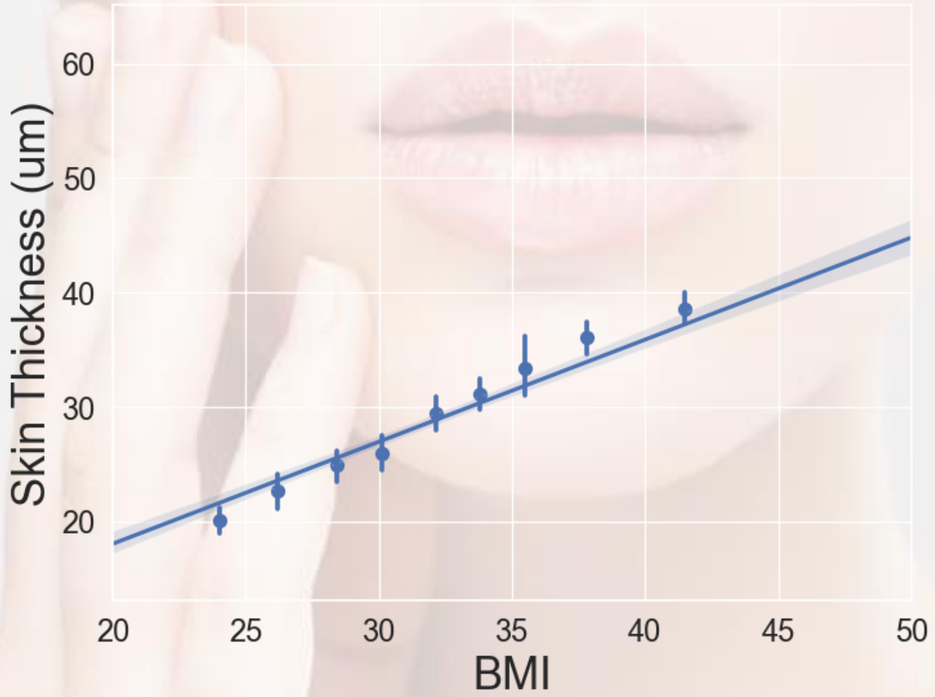
- Women with more then 5 pregnancies are a risk group
- The diabetes pedigree has very limited impact below value = 1
- Glucose level is a major sign of diabetes
- Diabetes develops predominantly in women in their 30s to 50s
- Overweight individuals (BIM > 25) are much more likely to have diabetes

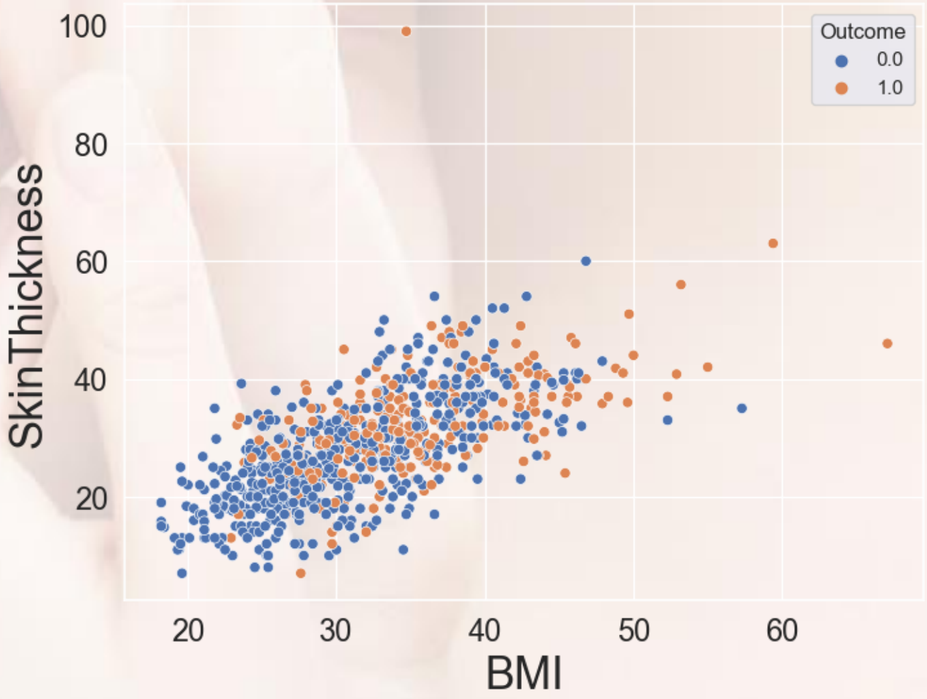
Curios findings

Skin Thickness vs BMI

Skin Thickness ≈ 1.1xBMI + 4.4

The thickness of the skin in is approximately linearly proportional to the Body mass index
(aka. How much muscle and fat are there in one's body)

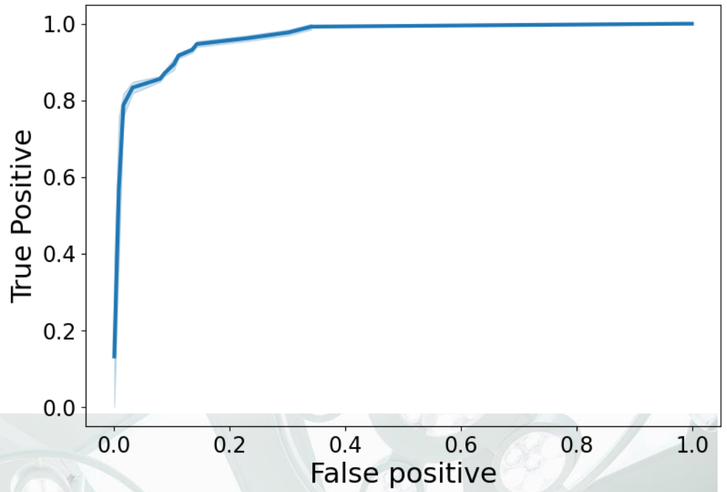


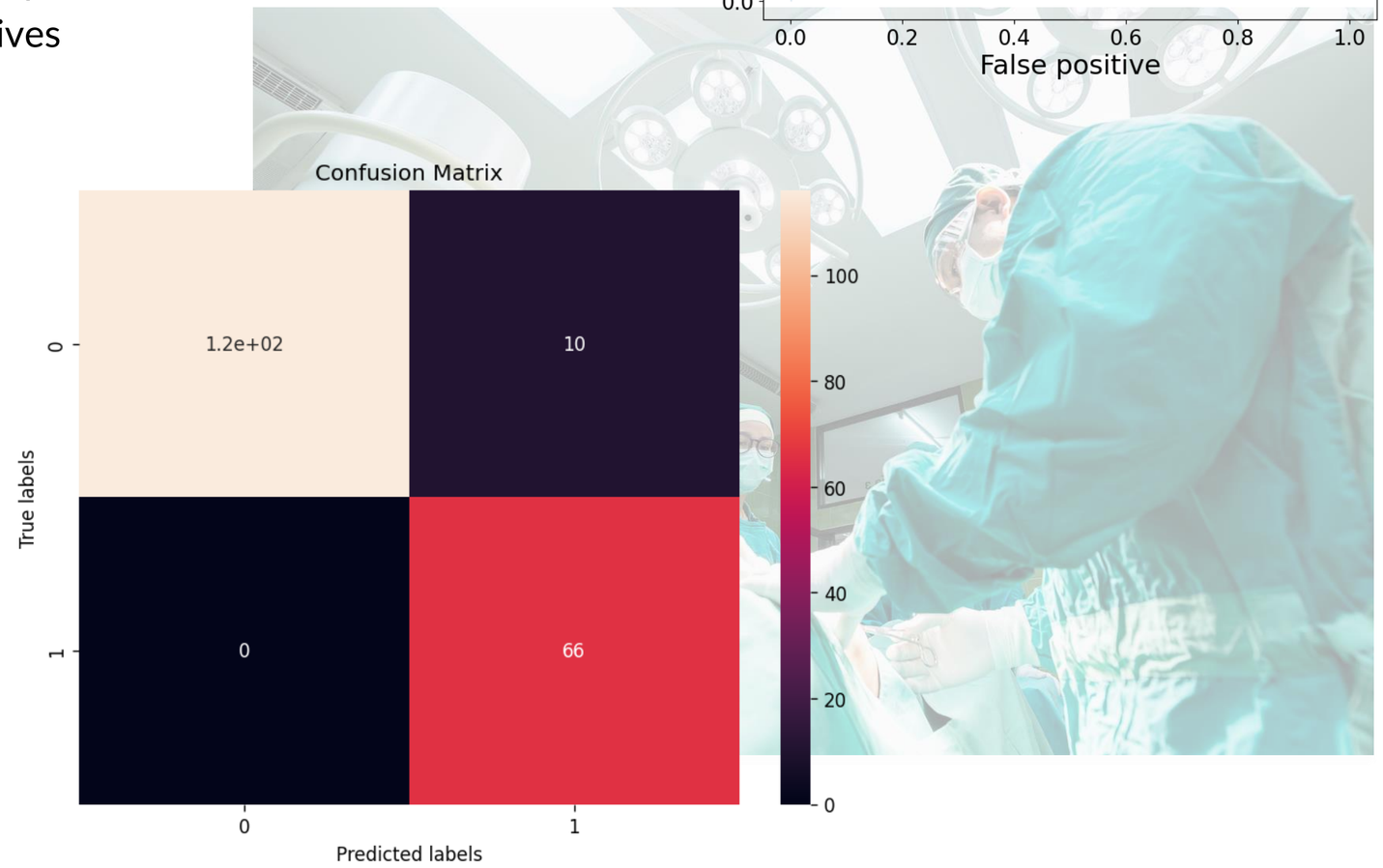


Machine Learning

The Model

By having 100% recall rate we can guarantee that no patients from the test set were False Negatives





The models

3 ML models were tried

- Logistic regression
- Random Forest
- XGBoosted Random Forests

The tuning

Random and grid search were implemented

Best model

Hyper-tuned XGBoost with:

- Recall = 100%
- Precision = 85%

Message to take home

Diabetes type II is a mostly predictable and preventable disease

Weight is a big factor

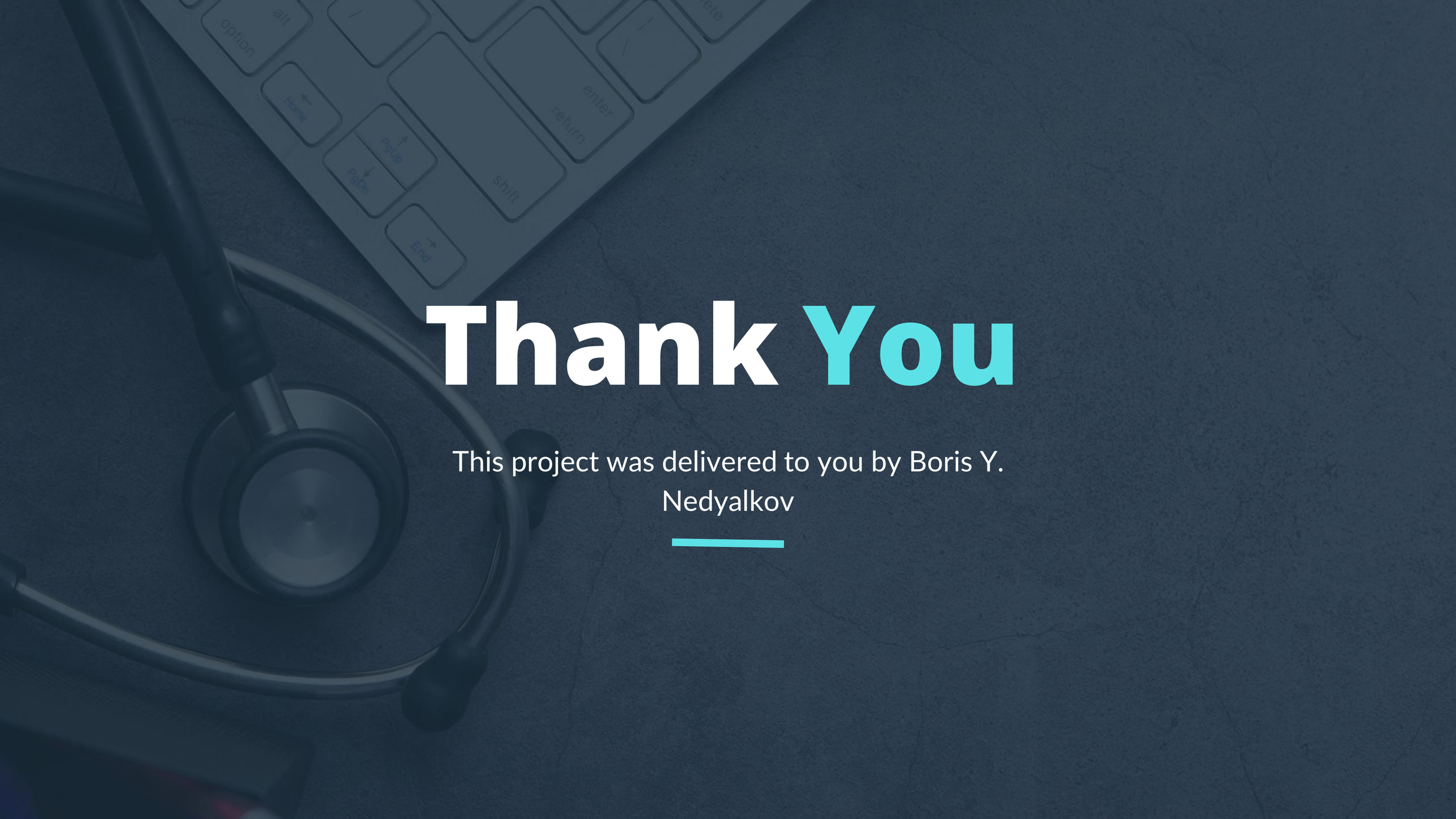
Having Body Mass Index over 25 puts one in risk of diabetes

Blood sugar levels

Balanced diet is important for avoiding/treating diabetes

The Model

A model is available that can with high accuracy identify diabetics from their clinical parameters



Thank You

This project was delivered to you by Boris Y. Nedyalkov