VIT®
BHOPAL
www.vitbhopal.ac.in

DSN 3039
Community Project 2020-21

Supervisor: Dr. Kanchan Lata Kashyap

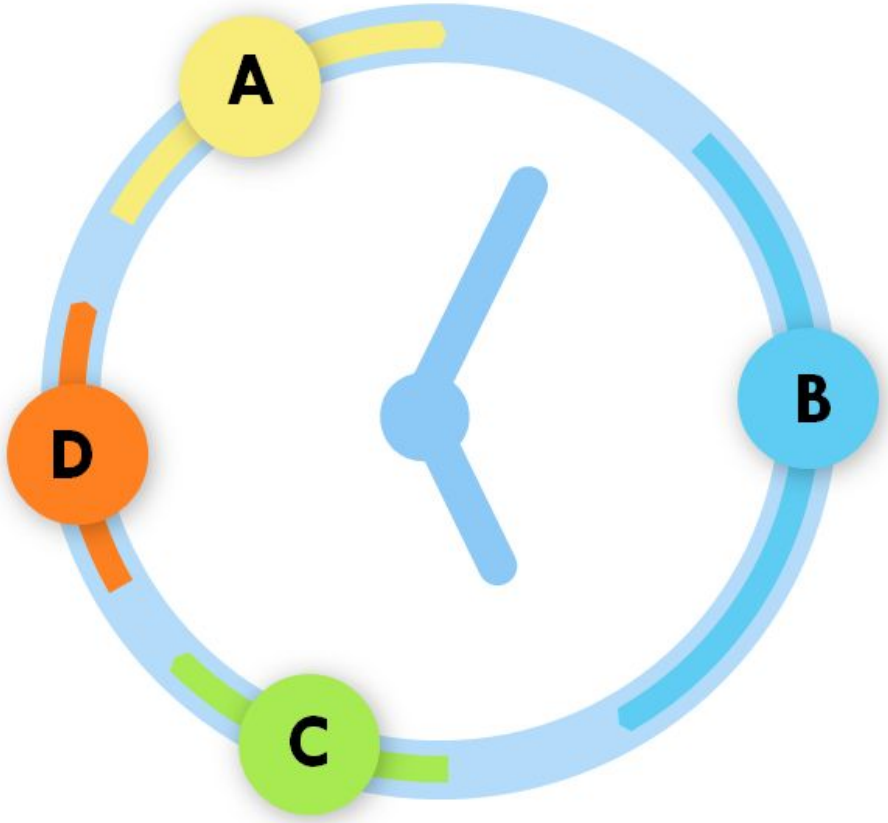
Date: 17th Oct'20


Diabetes
Predictor
ada

Group Members

1. Akash
2. Anant Jaiswal
3. Avanish Sandilya
4. Dishant Mehta
5. Manasi Muchrikar
6. Nishq Poorav Desai
7. Rahul Khandebharad
8. Utkarsha
9. Umang Mahesh Rane

Index

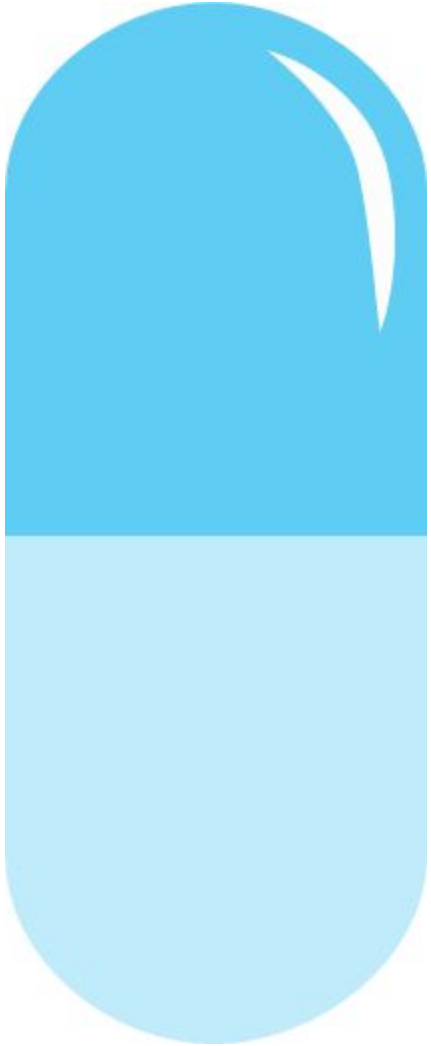


Objective

Diabetes is a health condition which causes a financial burden on people with no stable background. Diabetes is not a dangerous health condition, but due to lack of proper guidance ,it gets converted into a severe health issue. A basic check through a questionnaire can help people with better advice to deal with diabetes.

Introduction

Diabetes is a disease that occurs when your blood glucose, also called blood sugar, is too high.



Diabetes occurs when your body cannot make or effectively use its own insulin, a hormone made by special cells in the pancreas.

Type 1 and type 2 diabetes are the most common forms of the disease.

India has an estimated 77 million people with diabetes, which makes it the second most affected in the world, after China. One in six people (17%) in the world with diabetes is from India.

Proposed Work

Here we are proposing a solution which will be a fusion of software and hardware elements that will be able to process the factor indicating diabetes-like blood sugar level, insulin level, and blood pressure. These factors then fed to the system will help analyze if the person is suffering from Diabetes or not. Later, recommending the diet for Diabetes free life.

Software Modules

Dataset

The PIMA diabetes dataset has been collected originally from National Institute of Diabetes , Digestive and Kidney Diseases that are specified in the Credits and Acknowledgement Section. In this , a survey was conducted on 768 people.

Feature Extraction

Feature Extraction is a technique which is used to pick or coalesce two or more variables in features, which can represent the dataset in a compact form with same accuracy.

Software Modules

In the dataset 8 independent variables have been identified as features including Number of pregnancies, Plasma glucose concentration in 2 hours in an oral glucose tolerance test, Diastolic blood pressure (mm Hg), Triceps skin fold thickness (mm), 2-Hour serum insulin (mu U/ml), Body mass index (weight in kg/(height in m)^2), Diabetes pedigree function and age.

Train-Test Split

Train-Test split is a method which divides the data arrays in two subsets i.e. for testing and training. The dataset have been divided for testing and training set in the ratio 1:3.

Software Modules

Standardization

Data Standardization is a process of tuning and re-scaling feature in such a manner that the resulting attribute have 0 average and standard deviation of 1.

Sequential Model

It is the basic Sequential Model is a network of Dense Layers, which is used for deep learning using Keras. It helps us in making a model comprising of many layers and sustain the balance of all the layers.

Software Modules

Keras Layers (for Neural Network)

Keras Layers are the fundamental units of Neural Networks. A layer comprises of a tensor-input and tensor-output computation function and a state, which is stored in Tensorflow variables. In this model 7 hidden layers or total 9 layers including first 8 layers with Rectified Linear Activation with 8, 32, 64, 256, 128, 256, 64 and 8 nodes respectively. The last layer uses Sigmoid Activation with 1 node that classifies as 1 and 0.

Software Modules

Compilation and Training

In Compiling and Training, The model is fed with the training data and an attempt is made by the model to predict the class, and with reinforcement learning, it continuously tries to reward and punish for the outcome of the attempted prediction and it re-iterates for better and fine-tuned Function.

Prediction

On the basis of the training provided to model with training data set, the model is tested with the testing data set, and the outcome of this Prediction is used to determine the efficiency of the model.

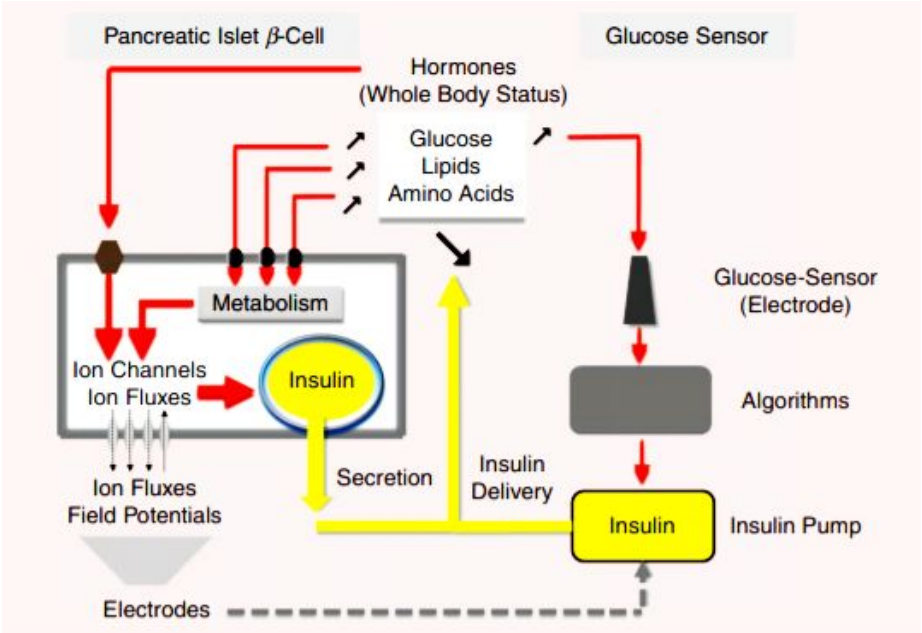
Software Modules

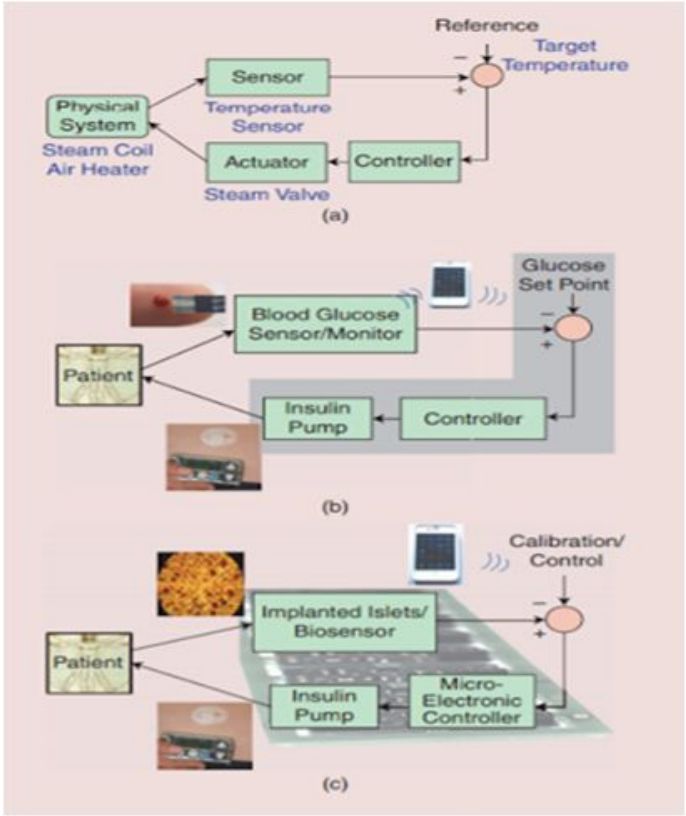
The training set is compiled with 220 epochs with batch size as 1 and verbose as 1. Based on these criteria predictions of testing set is made.

Output Class

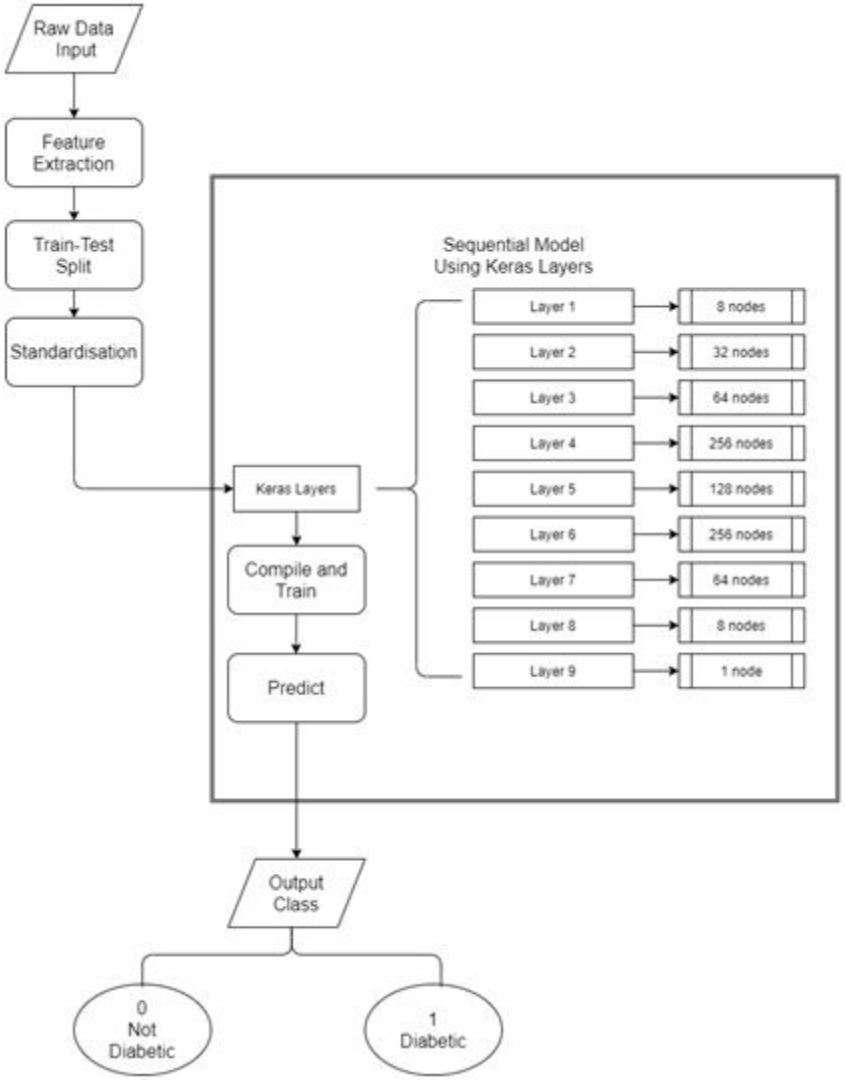
Based on the following Model output of testing set is compared to actual dataset and accuracy is calculated using confusion matrix. The Predicted output would be of the form 1 as Diabetic and 0 as Not Diabetic.

Hardware Modules





System Architecture Diagram

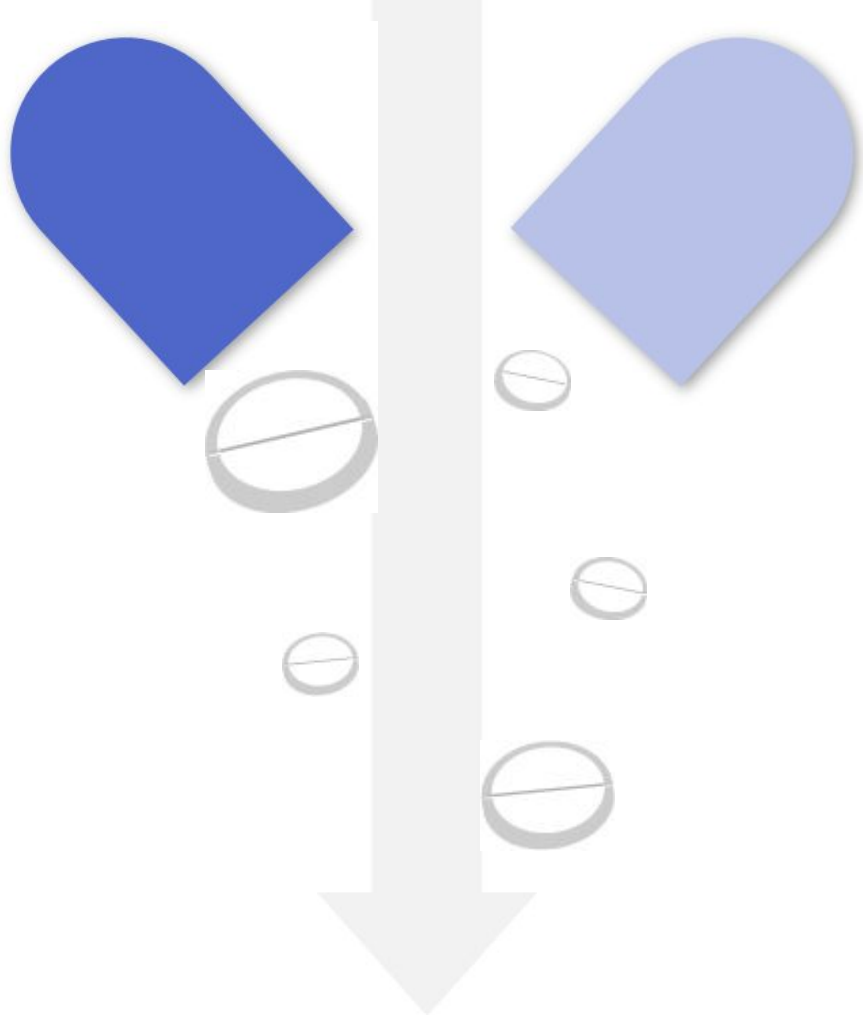


Software requirements

Existing Work and limitations

- Kao used a sub-ppm acetone gas sensor for Diabetes detection using 10 nm thick ultra thin FETs.
- Peter Henry Scanlon published a paper on effects of age on diabetes and diabetes care.

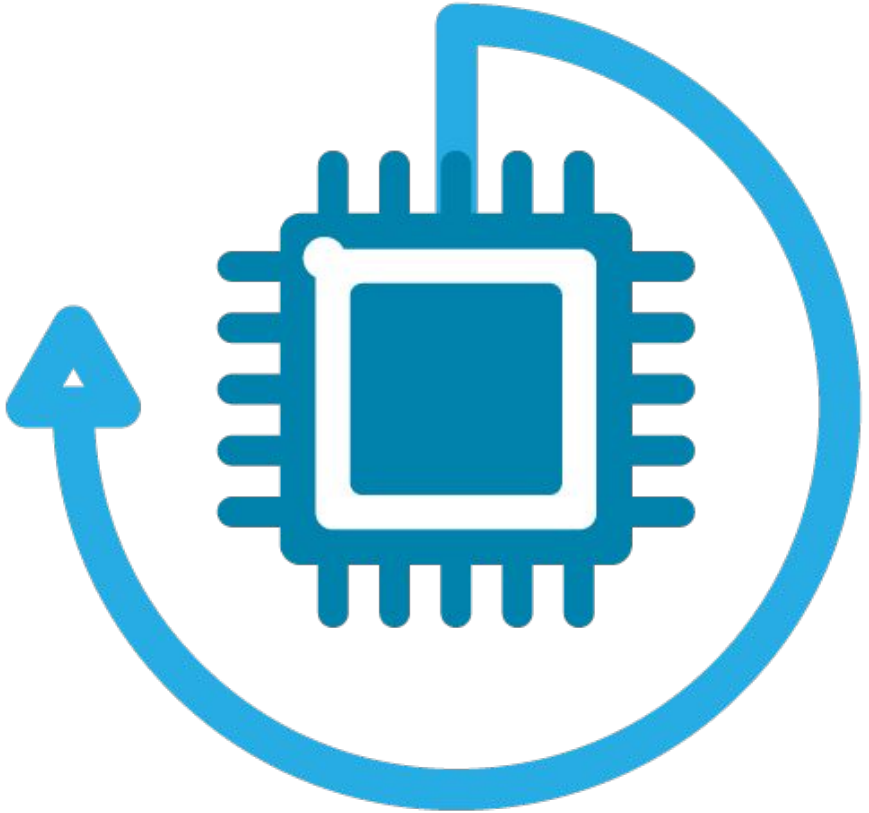
- Eric A Orzeck published a paper on detection of diabetes with comparison between screening methods.
- M J Whichelow published a paper on analysis of blood sugar measurements in diabetes detection and diagnosis.
- Maigen Zhou published a paper on geographical variation in Diabetes prevalence and detection in China.



Real time usage

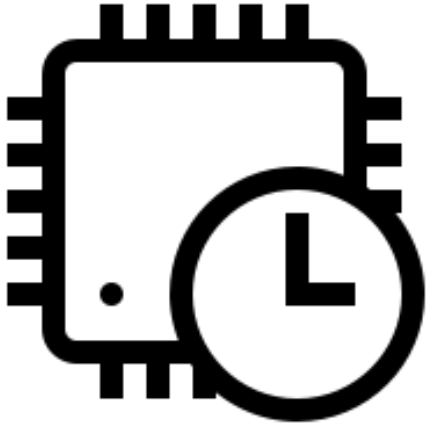
We will use the sensors to serve the following purposes:

- Measuring glucose level
- Blood pressure level
- Skin thickness
- Insulin Levels.

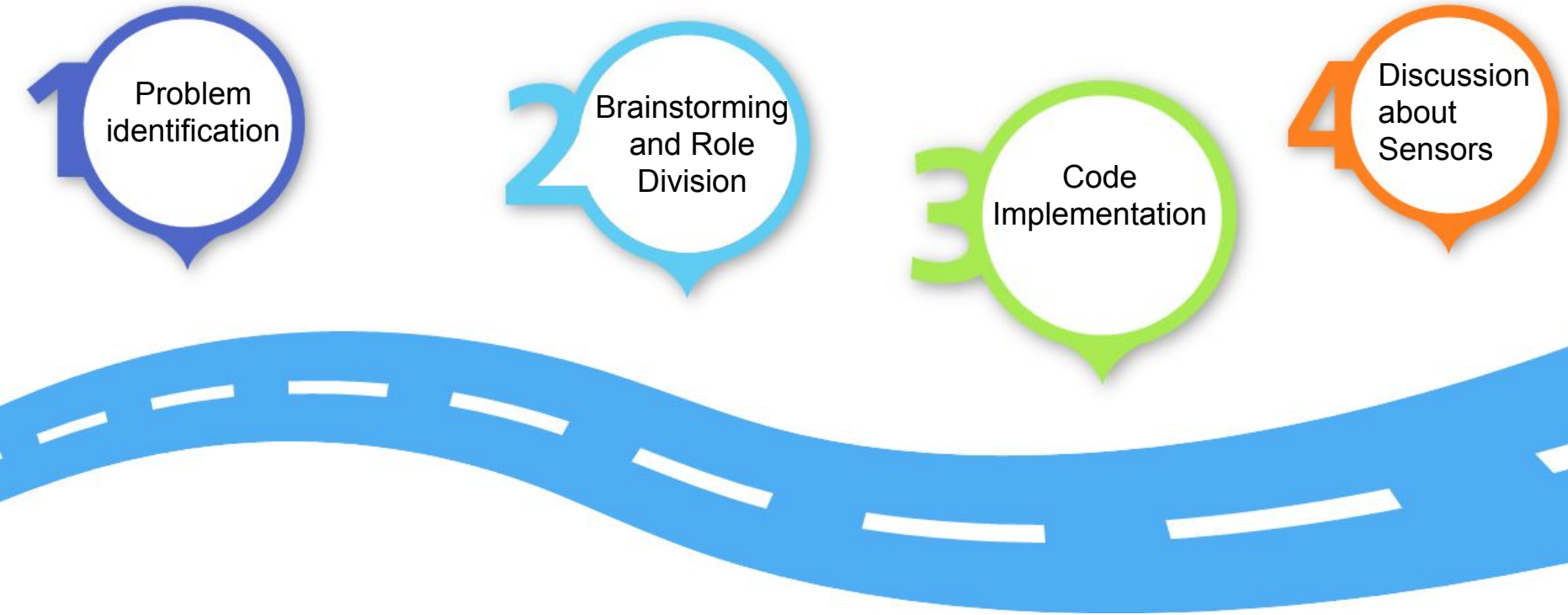


For two output class the predicted outcome can be categorised as

- False Negative, when the person is diabetic though the model predicted as non-diabetic.
- False Positive, when the person is non-diabetic though the model predicted as diabetic.
- True Negative, when the person is non-diabetic and the model predicted as non-diabetic.
- True Positive,when the person is diabetic and the model predicts as diabetic.



Project Timeline Chart



Role of Students

Software Team: Would engage in constructing the algorithm for analyzing the parameters to determine if the person is suffering from Diabetes. And also build PPT for the project.

Avanish Sandilya

- Code Implementation
- Planning Modules

Nishq Poorav Desai

- Code Implementation
- Planning Modules

Role of Students

Rahul Rajesh Khandebharad

- Information Gathering
- Designing presentation
- Documentation

Utkarsha

- Designing Presentation
- Front-End/ UI Design

Umang Mahesh Rane

- Project Diary
- Front- End Design

Role of Students

Hardware Team: Would engage in constructing the sensor to measure the parameters.

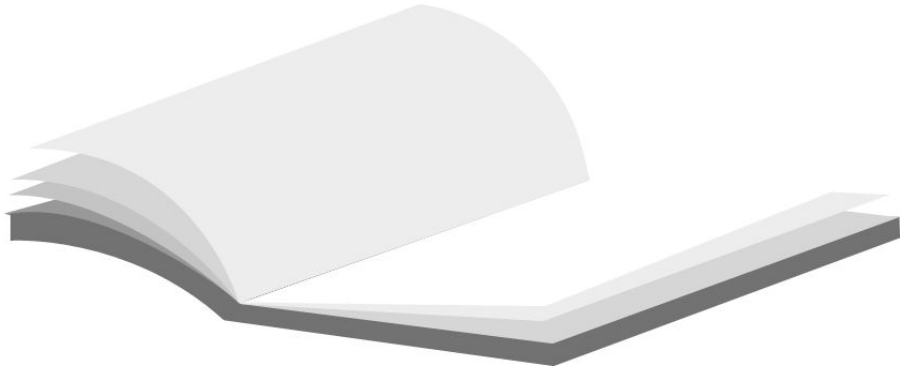
- Akash
- Anant Jaiswal
- Dishant Mehta
- Manasi Muchrikar

- Blood Sugar Sensor
- Blood Pressure Sensor
- Insulin Sensor

References

1. Carr, Darcy Barry, and Steven Gabbe. "Gestational diabetes: detection, management, and implications." Clinical Diabetes, vol. 16, no. 1, 1998, p. 4+. Accessed 2 Aug. 2020.

2. Marco Righettoni and Antonio Tricoli: Toward portable breath acetone analysis for diabetes detection. Journal of Breath Research, Volume 5, Number 3 Published 9 August 2011



thank you!