

# Breast Cancer Prediction Documentation

## Overview

The Breast Cancer Prediction project aims to develop a predictive model for classifying breast cancer cases as benign or malignant. By leveraging historical data and employing machine learning techniques, the project seeks to provide a reliable tool for assisting medical professionals in diagnosing breast cancer.

## Installation

To run this project, you'll need Python and the following dependencies:

- numpy
- pandas
- matplotlib
- scikit-learn
- tensorflow

## Project Structure

The project is structured as follows:

### 1. Data Loading and Preprocessing:

- The breast cancer dataset is loaded from scikit-learn, converted to a structured DataFrame, and relevant statistics are summarized.
- Missing values are checked, and the distribution of the target variable is examined.

### 2. Data Segregation:

- The dataset is divided into features (X) and labels (y).
- The data is split into training and testing sets using the **train\_test\_split** function.

### 3. Feature Scaling:

- Standardization is applied to the features using **StandardScaler** to ensure that all features contribute equally to the model.

### 4. Neural Network Implementation:

- A simple neural network is implemented using TensorFlow and Keras.
- The architecture includes one input layer, one hidden layer with ReLU activation, and one output layer with sigmoid activation for binary classification.

### 5. Model Compilation and Training:

- The neural network model is compiled with the 'adam' optimizer and 'binary\_crossentropy' loss.

- The model is trained using the training set, and accuracy and loss metrics are monitored.

6. **Model Evaluation:**

- The trained model is evaluated on the test set, and accuracy and loss metrics are reported.

7. **Visualization:**

- Training and validation accuracy, as well as training and validation loss, are visualized using matplotlib.

8. **Interactive Prediction System:**

- An interactive system is implemented to take user input for new data and make predictions using the trained model.

## Usage

To run the Breast Cancer Prediction project, follow these steps:

1. **Dependencies:**

- Ensure that you have the required dependencies installed, including NumPy, Pandas, Matplotlib, scikit-learn, and TensorFlow.

2. **Run the Code:**

- Execute the provided Python script containing the project code.

3. **Interactive Prediction:**

- After model training, the system prompts for user input to predict the class of a tumor based on the input features.

## Results

Upon completion, the project provides insights into the predictive performance of the model, visualizations of the training process, and an interactive system for real-time predictions.