Project Title: Credit Card Usage Prediction Using Neural Networks

Overview:

This project involves building a neural network model to predict credit card usage based on a dataset from a hypothetical bank. The primary goal is to illustrate the process of using a simple neural network to analyze and predict consumer behavior regarding credit card usage.

Problem Statement:

The dataset includes information on consumers' use of credit card facilities, including variables such as the number of years a customer has been with the bank (Years), the customer's salary (Salary), and whether the customer has left an unpaid credit card balance at the end of at least one month in the prior year (Used Credit).

Objective:

- Predict whether a customer will leave an unpaid credit card balance at the end of at least one month in the prior year (Used Credit: 1) or pay off the balance at the end of each month (Used Credit: 0).

Dataset:

The dataset (CreditCards.xlsx) consists of the following columns:

1. **Years**: Number of years the customer has been with the bank.
2. **Salary**: Customer's salary in thousands of dollars.
3. **Used Credit**: Binary variable indicating credit card usage behavior (1 = unpaid balance, 0 = balance paid off).

Solution Approach:

The project uses a neural network to analyze the data and predict the Used Credit variable. Here's a detailed explanation of the steps involved:

1. **Data Preprocessing**:
    - Import the dataset and handle any missing values.
    - Normalize the input features (Years and Salary) to improve the performance of the neural network.
2. **Model Construction**:

- Construct a simple neural network using a framework such as TensorFlow or Keras.
- The network consists of an input layer, one hidden layer, and an output layer:
  - **Input Layer**: Takes the normalized features (Years and Salary).
  - **Hidden Layer**: Applies a non-linear activation function to learn complex patterns in the data.
  - **Output Layer**: Uses a sigmoid activation function to output a probability score between 0 and 1, representing the likelihood of the customer having an unpaid balance.

3. **Training the Model**:
   - Split the dataset into training and testing sets.
   - Train the neural network using the training set, optimizing the weights using backpropagation and an appropriate loss function (e.g., binary cross-entropy).
4. **Model Evaluation**:
   - Evaluate the model's performance on the testing set using metrics such as accuracy, precision, recall, and the Area Under the ROC Curve (AUC).
   - Fine-tune the model by adjusting hyperparameters or adding regularization if necessary.
5. **Model Interpretation**:
   - Interpret the model's predictions and identify the key factors influencing credit card usage.
   - Provide actionable insights and recommendations based on the model's findings.

Implementation:

The implementation details are provided in the Excel file (Humza Malik BDA Individual Assignment 2.xlsx), which includes the neural network model built to solve the problem. The solution involves creating the neural network, training it with the provided data, and evaluating its performance to ensure accurate predictions.

Conclusion:

By leveraging neural networks, this project demonstrates a powerful approach to predicting consumer behavior in the context of credit card usage. The findings can help financial institutions better understand their customers and implement strategies to reduce the risk of unpaid balances.

Files:

- CreditCards.xlsx: The raw dataset used for the analysis.
- Humza Malik BDA Individual Assignment 2.xlsx: The detailed solution, including the neural network model and its implementation.
- Neural Network Problem.png: The problem statement and dataset description.

This description provides a comprehensive overview of the project, explaining the problem at hand and detailing the neural network-based solution. It is suitable for uploading to GitHub to showcase your work on this project.