**Introduction**

This documentation outlines the approach, model architecture, data handling, and insights gained from a deep learning project. The project aims to predict a "score" based on a dataset that includes age, location, medication, existing illness, and previous illness information, with the goal of recommending a healthcare plan.

**Data Generation**

The dataset used in this project was generated with the following parameters:

* Age: Randomly generated between 5 and 65.
* Location: Categories include City, Metro City, and Town.
* Medication: 15 common medications.
* Existing Illness: 15 common illnesses.
* Previous Illness: 15 common illnesses.

To calculate the "score" for each data point, an Excel formula was utilized. This formula considers factors such as age, medication seriousness, existing illness, previous illness, and location, categorizing them into three levels of seriousness: 1 (least serious), 2 (less serious), and 3 (most serious).

**Data Preprocessing**

Before training the machine learning model, several preprocessing steps were performed:

* Medication and illness were mapped to seriousness levels using predefined dictionaries.
* Numeric features, including age, were standardized.
* The dataset was split into training and testing sets.

**Model Architecture**

The neural network model used for this project comprises the following layers:

* Input layer with an appropriate input shape.
* Three hidden layers with 128, 64, and 32 units, respectively, using the ReLU activation function.
* An output layer for regression with a single unit.

The model was compiled using the Adam optimizer and the mean squared error loss function.

**Training the Model**

To train the model, the following steps were taken:

* The dataset was loaded.
* Features were prepared for training, ensuring correct data types.
* The model was compiled.
* Training was conducted over 100 epochs with a batch size of 32 and a validation split of 20% of the training data.
* Model performance was evaluated using the mean squared error (MSE).

**Testing the Model**

The trained model can be used to make predictions for healthcare plan recommendations based on user input. The following steps should be followed:

* Load the trained model.
* Map user input (age, medication, existing illness, previous illness, and location) to seriousness levels.
* Standardize numeric features.
* Predict the score for the user.

**Results and Insights**

The model provides healthcare plan recommendations based on the predicted score. These recommendations are categorized as follows:

* Basic Plan (Score <= 1.5)
* Gold Plan (1.5 < Score <= 2.5)
* Platinum Plan (Score > 2.5)

**Insights:**

* The model's recommendations are based on the combined seriousness of age, medication, existing illness, previous illness, and location.
* The scoring formula allows for personalized healthcare plan suggestions.

**Instructions for Running the Code**

To run the code, follow these steps:

1. Clone the GitHub repository: [GitHub Repo Link](https://github.com/SouravPathak25/healthcare_plans_recommendation)
2. Install the necessary dependencies (e.g., TensorFlow, pandas, scikit-learn).
3. Run the data generation code, followed by the training code.
4. After training, run the testing code to make predictions for healthcare plan recommendations.
5. For testing the model use the specific data from the data generated from the dummy dataset to confirm the model's accuracy.

**Conclusion**

In this machine learning assignment, we generated a dataset and built a deep learning model to predict healthcare plan recommendations based on user information. The project successfullydemonstrates how machine learning can be applied to personalize healthcare suggestions, with the model providing recommendations aligned with the seriousness of various factors.