Machine Learning in Healthcare: Notebooks

This repository contains a collection of Jupyter Notebooks demonstrating the application of machine learning techniques to various problems in healthcare. Each notebook addresses a specific case study, from disease prediction to anomaly detection.

Repository Link: https://github.com/eyash24/AI_Healthcare

Notebooks

- genetic_risk_profiling.ipynb: This notebook explores the use of unsupervised learning, specifically clustering algorithms, to group patients based on their genetic data. The goal is to identify distinct genetic subgroups that may have a predisposition to certain health conditions.
- hospital_readmission.ipynb: This notebook focuses on predictive modeling to forecast patient outcomes. It includes tasks for classification (predicting the likelihood of hospital readmission) and regression (predicting the length of a hospital stay).
- heart_disease_prediction.ipynb: This project utilizes supervised machine learning models to predict the presence of heart disease based on patient health metrics. The notebook walks through data preprocessing, model training, and performance evaluation.
- chest-x-ray-pneumonia-cnn-transfer-learning.ipynb: This notebook demonstrates the use of deep learning and transfer learning for medical image analysis. The model is trained to classify chest X-ray images to detect the presence of pneumonia.

Setup and Running the Notebooks

Prerequisites

It requires Python 3.8+ and Jupyter Notebook installed on system to run these notebooks or it be imported into Google Colab or Kaggle.

For Macbook download the following libraries:

```
tensorflow-macos==2.17.0
tensorflow-metal==1.1.0
```

Install the following libraries:

```
numpy==2.1.1
pandas==2.2.2
scipy==1.14.1
scikit-learn==1.5.2
matplotlib==3.9.2
```

```
seaborn==0.13.2
plotly==5.24.1
optuna==4.0.0
tensorflow==2.17.0
keras==3.5.0
opencv-python==4.10.0.84
ipython==8.27.0
```

Installation

It is recommended to use a virtual environment to manage project dependencies. Once your environment is active, you can install all required packages using the provided requirements.txt file.

```
pip install -r requirements.txt
```

Running the Notebooks

After installing the packages, you can launch the Jupyter Notebook server from the project directory.

```
jupyter notebook
```

This will open a web browser showing the contents of the directory, where you can select and run any of the notebooks.

Data Sources

The datasets used in these notebooks are publicly available from sources like Kaggle and the UCI Machine Learning Repository. Links to the specific datasets are provided within each notebook.