



Nowruz Projects

Shahid Beheshti University - Bachelor's Program

Artificial Neural Networks - Winter 2024

Medical Appointment No Shows Dataset

Introduction:

The Medical Appointment No Shows dataset comprises data about medical appointments and whether patients attended their appointments. This dataset presents an excellent opportunity for students to apply their knowledge of artificial neural networks (ANNs), focusing on implementing multi-layer perceptron (MLP) models using PyTorch. Additionally, students will explore model architectures and other techniques through literature review to enhance their results.

Dataset Description:

The dataset includes various features such as patient age, gender, appointment date and time, scheduled date and time, neighborhood, scholarship status, and whether the patient received an SMS reminder. The target variable indicates whether the patient showed up for the appointment (1 for 'showed up' and 0 for 'no-show').

Tasks:

Data Preprocessing

- Handle missing values: Develop strategies for dealing with missing values, either through imputation or removal.
- Explore imbalance: Visualize class distribution to understand the extent of class imbalance.

Implementation of MLP Model using PyTorch

- Implement an MLP model using PyTorch, considering relevant libraries and functions.
- Research model architectures: Explore existing literature to understand various model architectures used in MLPs.

Literature Review on Model Architectures and Techniques

- Read papers on different model architectures used in MLPs, such as deep MLPs, wide and deep networks, or attention mechanisms.
- Investigate techniques to enhance model performance, including advanced activation functions, initialization methods, and regularization techniques.

Experimentation with Activation Functions and Optimizers

- Experiment with different activation functions (e.g., ReLU, sigmoid, tanh) and optimizers (e.g., Adam, SGD) to observe their impact on model performance.
- Implement these variations in the MLP model and evaluate their convergence speed and accuracy.

Regularization Techniques and Hyperparameter Tuning

- Implement dropout and L2 regularization techniques to prevent overfitting.
- Perform hyperparameter tuning to find optimal values for learning rate, batch size, and other parameters, utilizing techniques like grid search or random search.

Model Training and Evaluation

- Train the MLP model on the training data and validate it using the validation set.
- Evaluate model performance using appropriate metrics such as accuracy, precision, recall, and F1-score.
- Utilize techniques like cross-validation for robust evaluation.

Visualization and Interpretation

- Visualize the training process of the MLP model, including loss and accuracy curves over epochs.
- Analyze learned representations by visualizing decision boundaries or feature importance.

Conclusion and Future Work

- Summarize findings from experiments and draw conclusions about the effectiveness of different techniques.
- Propose future research directions based on insights gained, including exploring novel architectures or incorporating additional features for improved prediction.

Dataset

You can download this dataset from this [link](#).

Good Luck, Have Fun, Code a Lot & Happy Nowruz 🌿🎉🥳