AICURE - PARSEC 4.0 IIT DHARWAD

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Title: Predicting Patient's Heart Rate Using Electrocardiography: A Comprehensive Analysis

Abstract:

This report outlines the step-by-step process undertaken to predict patients' heart rates using electrocardiography (ECG) data. The approach involves data preprocessing, feature selection, scaling, model training, evaluation, and model deployment for practical use.

1. Introduction:

The primary objective of this project is to develop a predictive model for determining patients' heart rates based on their electrocardiography data. The study involves several key steps to ensure accurate predictions and reliable model performance.

2. Data Exploration:

The initial step involved a thorough exploration of the electrocardiography dataset. The goal was to identify the features available in the dataset and assess their relevance to the prediction task. This step helps in understanding the structure of the data and informs subsequent decisions in the analysis.

3. Data Cleaning:

To ensure data consistency and reliability, a check for null values in the dataset was conducted. Handling missing values is crucial to prevent inconsistencies in the subsequent analysis. Any null values found were appropriately addressed to maintain the integrity of the dataset.

4. Feature Selection:

Correlation analysis was performed to identify the relationships between different features in the dataset. This step aids in selecting relevant features that contribute significantly to the accuracy of the predictive model. By focusing on key features, the model can be trained more effectively.

5. Data Scaling:

Given the wide range of values in the dataset, scaling was applied to standardize the data. This normalization ensures that all features contribute equally to the model training process, preventing any particular feature from dominating the others.

6. Data Splitting:

To evaluate the model's generalization ability, the dataset was split into training and testing sets. The training set was used to train the model, while the testing set remained unseen during training. This approach helps assess the model's performance on new, unseen data.

7. Model Training:

The selected model was trained using the training dataset to learn the underlying patterns and relationships between the features and the target variable (heart rate). Training involves iteratively adjusting model parameters to minimize the difference between predicted and actual values.

8. Evaluation:

After training, the model's performance was evaluated using the test dataset. The root mean square error (RMSE) was calculated to quantify the disparity between predicted and actual heart rates. A lower RMSE indicates a more accurate predictive model.

9. Model Saving:

To facilitate future use and deployment, the trained model was saved. This ensures that the model can be easily loaded and applied to new data, as illustrated in the run.py file designed for predicting heart rates using the model.

10. Conclusion:

In conclusion, the predictive model developed for determining patients' heart rates based on electrocardiography data demonstrates promising accuracy. The systematic approach involving data preprocessing, feature selection, scaling, and evaluation ensures the reliability and generalization of the model. The saved model allows for seamless integration into practical applications for real-time heart rate predictions.