MACHINE LEARNING MODEL REPORT: PREDICTING HEART RATE

OVERVIEW

1. Introduction:

- ***Objective:*** *The goal is to develop a machine learning model that accurately predicts heart rate based on a set of physiological features.*
  Selected Model: Gradient Boosting Regressor
  Performance Metric: Mean Absolute Error (MAE)

2. Project scope

- ***Source****: The dataset comprises physiological features and heart rate observations.*
  Features*: VLF, VLF_PCT, LF, LF_PCT, LF_NU, HF, HF_PCT, HF_NU, TP, LF_HF, HF_LF, SD1, SD2, sampen, higuci, MEAN_RR, MEDIAN_RR, SDRR, RMSSD, SDSD, SDRR_RMSSD, pNN25, pNN50, KURT, SKEW, MEAN_REL_RR, MEDIAN_REL_RR, SDRR_REL_RR, RMSSD_REL_RR, SDSD_REL_RR, SDRR_RMSSD_REL_RR, KURT_REL_RR, SKEW_REL_RR.*
  Label*: Heart Rate (HR)*

3. Preprocessing:

- Data Cleaning: Checked for and handled missing values.
- Feature Selection: Considered relevant features based on domain knowledge and importance analysis.
- Label Encoding: Applied label encoding if categorical variables were present.
- Train-Test Split: Split the dataset into training and testing sets.

4. Model Selection:

- Algorithm: Gradient Boosting Regressor

- Rationale: Chosen for its ability to handle complex relationships and boost the performance of weak learners.
- Parameters: n_estimators=100, random_state=42 (default values for simplicity)

5. Model Training:

Gradient Boosting Regressor was trained on the training set.

Hyperparameter Tuning: Basic hyperparameter values were used, further tuning may improve performance.

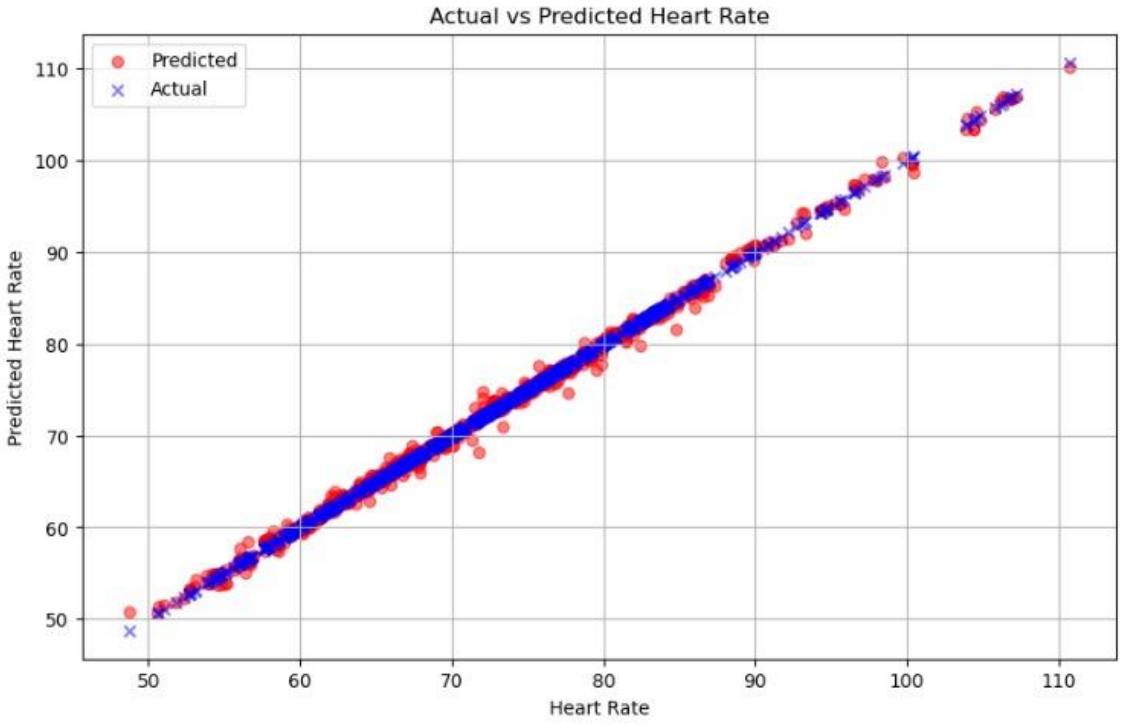

Fig1. Graph of Actual Vs Predicted Heart Rate

6. Model Evaluation:

MAE: The Mean Absolute Error of the model on the test set is 0.4006.

Interpretation: The MAE represents the average absolute difference between predicted and actual heart rates. A lower MAE indicates better model accuracy.

7. Conclusion:

The Gradient Boosting Regressor shows promise in accurately predicting heart rates based on the selected features.

Further optimization, hyperparameter tuning, and exploration of alternative models may enhance predictive performance.

8. Future Work:

Explore feature engineering techniques for improved model interpretability.

Investigate the impact of additional features or alternative algorithms on model performance.

Consider cross-validation for a more robust assessment of model generalization.

This report provides an overview of the machine learning model developed for heart rate prediction, the preprocessing steps undertaken, and an evaluation of the model's performance.