I, **Jaivardhan Tamminana**, was responsible for leading the machine learning model development in the **"Metro Line Prediction using Machine Learning"** project, contributing significantly to the system's technical foundation and predictive capabilities.

My core responsibilities included:

- **Model Research, Evaluation, and Finalization**

  - Independently researched and evaluated multiple algorithms, including Random Forest Classifier (RFC), XGBoost, and RBF-SVM.

  - Conducted iterative testing using cross-validation and precision-recall analysis.

  - Finalized Random Forest as the optimal model for its predictive stability and robustness on the project's feature set.

- **Model Optimization**

  - Fine-tuned hyperparameters of Random Forest and XGBoost using grid search and randomized search strategies.

  - Balanced predictive accuracy with computational efficiency for scalable deployment.

- **Dataset Curation and Feature Engineering**

  - Collaborated with Soumesh and Vinothkumar, who led the data collection process by sourcing district-level data from government portals and open datasets.

  - Computed population density as a derived feature using district-level population and area metrics.

  - Applied Recursive Feature Elimination with Cross-Validation (RFECV) to select the five most informative features.

  - Addressed class imbalance using SMOTETomek resampling and data augmentation techniques.

- **Model Handoff for System Integration**

  - Validated the predictive model and coordinated with Soumesh for the handoff of the machine learning pipeline for API and front-end integration.

My contributions formed the core predictive engine of the application, ensuring technical soundness, scalability, and practical utility.