

Vehicle Silhouette Classification - One Pager

Project Objective

Development of a machine learning model to classify vehicles based on numerical silhouette data into three vehicle classes.

Approach

1. Data Preparation:

- Removed redundant features
- Split into training and test datasets (test set: 500 samples)
- Scaling data for specific models (SVC, Logistic Regression)

2. Model Training:

- Models tested: Random Forest, SVC, Logistic Regression
- Adjustments: `class_weight="balanced"`, increased `max_iter` for Logistic Regression

3. Evaluation:

- Metrics: Accuracy, F1-Score (macro), Training Time
- Selection of best model based on highest F1-Score

4. Visualization:

- Confusion Matrix and Classification Report for the best model
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Results

- **Best Model:** Logistic Regression
- **Accuracy:** ~93.4%
- **F1-Score (macro):** ~0.93
- **Training Time:** 0.286 seconds
- **Random Forest:** similarly strong (~92.4% Accuracy), faster training
- **SVC:** Significantly worse performance (~62% Accuracy)

Recommendations

- Use Logistic Regression as the primary model
 - Further fine-tuning possible (hyperparameter optimization)
 - Analyze misclassified cases to improve the model
 - Recommended integration into production systems
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Next Steps

- Expand with deep learning approaches
- Continuous model updates with new data
- Evaluation of additional classification algorithms