Automatic labeling of vehicle blinker detection dataset

Sten M. Nelson, Eidi Paas, Noman Ashraf, Salme Ussanov

Introduction

Sten Marcus Nelson - Developer Guru

Tambet Matiisen - Maestro (Project Owner)

Eidi Paas - Data Ninja

Salme Ussanov - Lead Rockstar

Noman Ashraf - Infrastructure Wizard

Problem statement

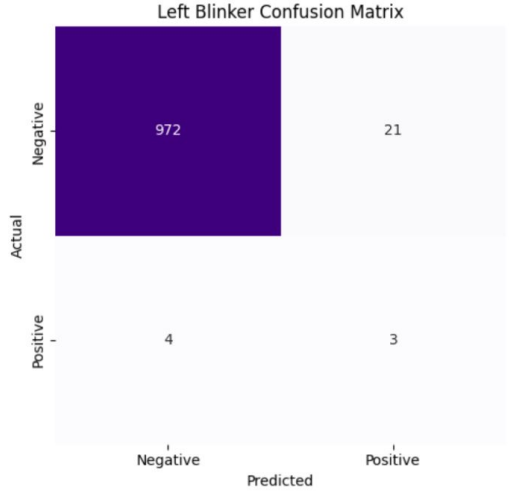
- Predicting other vehicles' intentions is essential in autonomous driving
- Detecting blinker states (left signal, right signal, or brake)
- Accurate detection reduces collision risks by improving action prediction
- Creating a labeled blinker dataset fills data gaps for better behavior prediction models

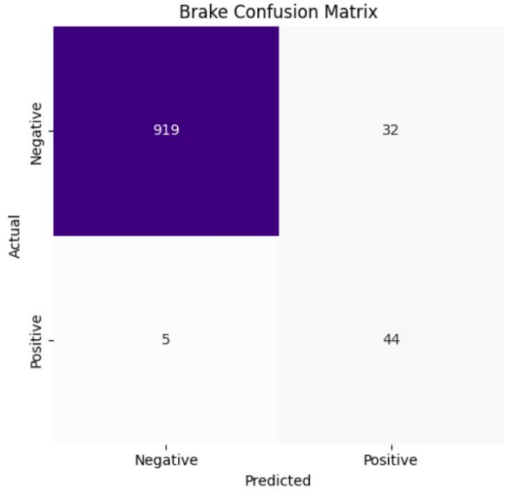
Methods

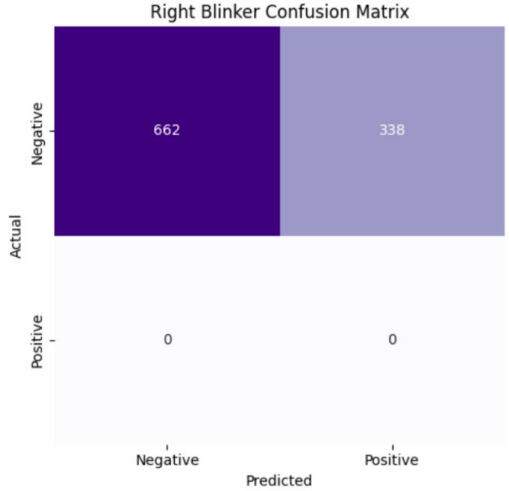
- Searching for appropriate training images
- Labeling training images manually
- Training using ResNet-18 pretrained model
- Evaluating based on accuracy, precision, recall and F1 score metrics
- Labeling 1000 test images from Tambet's training set

Results

- **Accuracy** L: 97.5% B: 96.3% R: 66.2%
- **Precision** L: 12.5% B: 57.9% R: 0%
- **Recall** L: 42.9% B: 89.8% R: 0%
- **F1-score** L: 19.4% B: 70.4% R: 0%







Task distribution

EIDI

Preparing training and test datasets (e.g. selecting and labeling images)

STEN

Searching for an appropriate model and creating the initial model

NOMAN

Improving the initial model and training it

SALME

Management stuff and training the model with different parameters

Learning highlights

- We explored ResNet and its features, including how to utilize it across multiple GPUs and train it with our dataset.
- Gaining the skill to identify and select quality datasets.
- Enhancing and improving the existing dataset.
- We held regular meetings and gained knowledge about Agile methodology.

Thank you for your attention!

GitHub repository

Our codebase is available in the link below:

https://github.com/salmeu/ML_project_2024