Fakultät für Informatik
Lehrstuhl für Echtzeitsysteme und Robotik

Scene-aware and Social-aware Motion Prediction for Autonomous Driving

Alfred Nguyen

Practical Course *Motion Planning for Autonomous Vehicles* WS 2023/2024

Advisor: Dr. Di Liu

Supervisor: Prof. Dr.-Ing. Matthias Althoff

Submission: 20. February 2024

Scene-aware and Social-aware Motion Prediction for Autonomous Driving

Alfred Nguyen
Technische Universität München
Email: alfred.nguyen@tum.de

***Abstract*—The abstract goes here.**

I. Problem Statement

In our current approach, we rely on a method known as ballistic integration for discrete integration in motion prediction. However, a significant challenge arises due to the inherent discretization error associated with working with discrete data.

Specifically, when we rearrange the integration formula to assess its fit with our data, we observe errors between the predicted acceleration and the ground truth. These errors will furthermore be shown in the results section. The differences in the accelerations affect the performance of the neural network, as the integration results are used as inputs to the network.

II. Concept Overview

Our method revolves around the use of a linear model to estimate the acceleration of vehicles. By equating and rearranging the formula, we specifically ensure that the predicted accelerations remain consistent. Whereas, using the old method of ballistic integration the discretization error heavily influences the accuracy.

The motivation behind choosing a linear model stems from the hope of better performance compared to alternative models tested during our experimentation. Through rigorous testing, we found that the selected linear model consistently outperformed others in terms of accuracy in predicting the car's movement. Additionally, the simplicity and interpretability of the linear model make it an attractive choice for motion prediction tasks, as we can comfortably use established methods to solve these systems.

To validate the effectiveness of our approach, we plan to compare the results obtained with our linear model against the old Ballistic Integration method, particularly focusing on the accuracy and consistency of the predicted accelerations. Additionally, we will evaluate the performance of our model using standard linear regression metrics such as R-value and MSE. Furthermore, we aim to extend our analysis by rearranging the model to predict velocity and distance, allowing us to assess its predictive capabilities. In the end, we will visualize our results using the existing drone-dataset-tool repo, which was provided.

III. Method

IV. Conclusion and Future Work

References

[1] H. Kopka and P. W. Daly, *A Guide to LaTeX*, 3rd ed. Harlow, England: Addison-Wesley, 1999.

V. Introduction

This demo file is intended to serve as a "starter file" for IEEE conference papers produced under LaTeX using IEEEtran.cls version 1.8 and later. I wish you the best of success.

mds

December 27, 2012

A. Subsection Heading Here

Subsection text here.

1) Subsubsection Heading Here: Subsubsection text here.

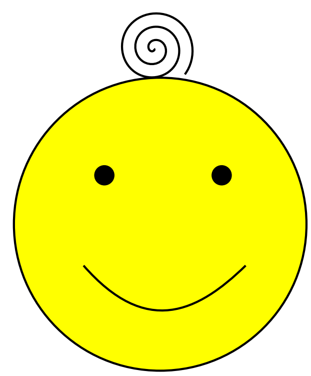

Fig. 1. A vector graphic loaded from a PDF file

VI. Conclusion

The conclusion goes here.

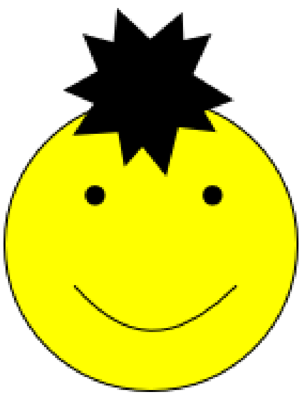

Fig. 2. A bitmap graphic loaded from a PNG file