Glossary

INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

Área Departamental de Engenharia de Electrónica e Telecomunicações e de Computadores

Electric Vehicle X Driving Range Prediction – EV X DRP

David Alexandre Sousa Gomes Albuquerque

Licenciado

Projecto Final para obtenção do Grau de Mestre em Engenharia Informática e de Computadores

Orientadores : Doutor David Pereira Coutinho
Doutor Artur Jorge Ferreira

Júri:

Presidente: Doutor Gonçalo Duarte

Vogais: Doutor David Pereira Coutinho
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Janeiro, 2022

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Aos meus ...

Acknowledgments

TODO: acknowledgements

Abstract

The increase of electric vehicle (EV) use as a reliable and eco-friendly means of transportation has increased rapidally over the past few years. When choosing an EV, the vehicle's performance is a decisive factor to be taken into account. An EV's driving range prediction depends on multiple factors that must be factored in to accurately infer results. As machine learning has become a widely used aproach for finding suboptimal solutions on complex mathematical problems, EV's driving range prediction through machine learning could become an accurate enough solution for any vehicle. Previous work has covered a history-based method on an adaptive model for EV's driving range prediction. The present project explores the implementation of a machine learning based model to learn from existing data, adapting with changes and aiming to provide more real and accurate results.

Keywords: electric vehicle; range prediction; energy consumption; machine learning

Resumo

TODO: resumo em português

Palavras-chave:

TODO: Palavras-chave do resumo em português

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Acronyms

EVs Electric Vehicles. 1

SOC state of charge. 1, 2

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dataset A structure containing data for a model. 2

eRange electric range. 1, 2

machine learning a branch of AI focused on learning from data. 1, 2

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Introduction

On today's day and age, the global concern on climate change has been a major focus on recent international agreements, such as the Paris Agreement [**parisAgreement**], incentivating many car manufacturers to introduce Electric Vehicles (EVs) as the eco-friendly solution for sustainable transport for the future.

As EVs have been increasing in popularity in recent years , car manufacturers have increased competitiveness on vehicle's performance, a decisive factor for consumers [**EGBUE2012717**]. citar

A vehicle's autonomy alson knwon as eRange, can be estimated through many driving data parameters, such as vehicle design, driver's behavior, wheather, road inclination and glsSOC estimation. The eRange accuracy allows consumers to rely on its vehicle for longer travel time and efficient charging plans , eRange estimation however, is a complex problem whitch has prompted previous studies in the past to provide a solution [**classicEVX**, **predictionOfeRange**]. citar

Machine learning is offen a viable tool for complex problem-solving , due to its nature of quickly finding suboptimal solutions, closest the best case scenerio possible. The eRange estimation problem could be solved with machine learning, requiring an initial phase to learn from the model and estimating through realtime state of charge (SOC) variations. citar

Prior work [**classicEVX**] on eRange estimation demonstrated that using an history-based algorithm on am adaptive model provides a more reliable eRange prediction

than a basic SOC - manufacturer data relation, this is mainly due to taking into account the vehicle's driving history.

This project approaches the eRange estimation problem with the use of machine learning based model to increase its accuracy.

explicar time series format

The model receives a dataset containing multiple trips and their respective vehicle power consumption [kW] and the vehicle speed [km/h] in a time series format. After training the model with the dataset, eRange prediction is possible through SOC monitoring based on previous dataset values. The following figure represents an overview of the system:

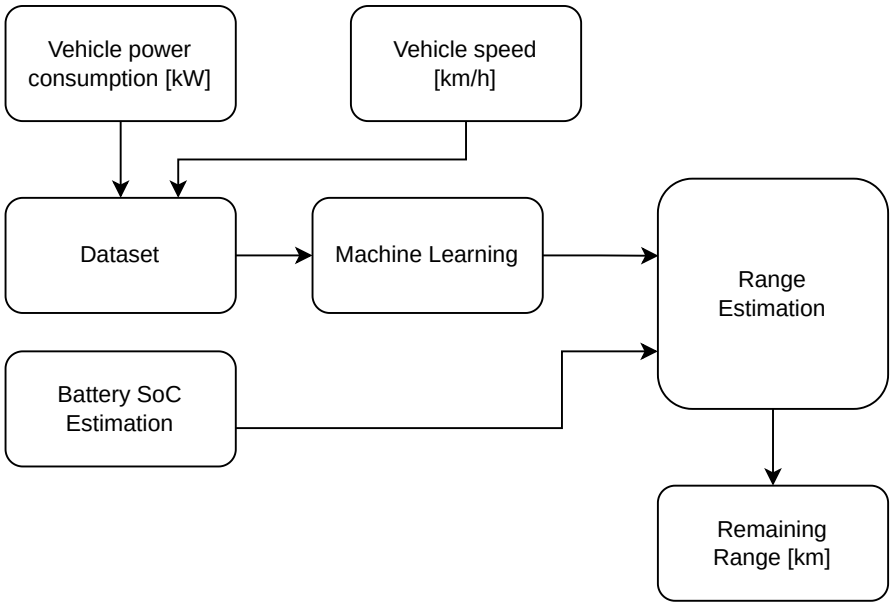

Figure 1.1: System overview.

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Development

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Planning