MIT RailSim

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ONE

INTRODUCTION

1.1 Project Overview

MIT RailSim is a sophisticated simulation tool developed upon decades of research (Koutsopoulos and Wang [KW07] and Zhou [Zho22]) and development to address the operational challenges faced by heavy rail systems in major metropolitan areas, particularly during peak periods when demand is highest. This tool provide microscopic simulation model for heavy rail systems, enabling detailed analysis of train behaviors, signaling systems (fixed-block and moving block), and interactions between trains and passengers. By employing MIT RailSim, reseachers can evaluate various operating strategies such as skip-stop, station consolidation, and dwell control to mitigate capacity bottlenecks.

The simulation framework is built using Python in a unix environment, ensuring robust performance and flexibility. The model's accuracy and reliability can be further enhanced through a calibration process using data from Operational Control Systems [WK11]. Numerous visualization tools allow users to analyze simulation outputs.

Numerous case studies (see Zhou *et al.* [ZKS20] and Zhou and Koutsopoulos [ZK22]) demonstrate how MIT RailSim has helped agencies address congestion, improve service reliability, and support long-term planning decisions.

1.2 Features

1.3 License

The project License is yet to be determined. Please contact the development team for more information.

CHAPTER

TWO

SETUP GUIDE

This project uses Pipenv for dependency management and packaging. You can learn about the dependencies looking at the Pipfile at the project root directory. Assuming you have a working version of pip, you can install Pipenv using pip:

```
$ pip install --user pipenv
```

Pipenv will take care of installing dependencies and creating the virtual environment. Run the following command from the project root directory (where the Pipfile and Pipfile.lock are located):

```
$ pipenv install
```

You can activate the virtual environment using:

```
$ pipenv shell
```

Depending on Python versions available on your system you may get an error like:

```
Error: the specified Python version (3.8) is not available on your system.
```

It is recommended to install the required Python version using pyenv. You can install pyenv using the instructions at https://github.com/pyenv/pyenv?tab=readme-ov-file#installation.

You may need to reactivate your shell after installing pyenv/pipenv to make sure they are added to the PATH.

Once you have pyenv installed, Pipenv will ask you if you like to use pyenv to install the required Python version. You can say yes and Pipenv will install the required Python version in the virtual environment.

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GETTING STARTED

3.1 Installation Guide

Provide step-by-step instructions for installing the project, including prerequisites.

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BIBLIOGRAPHY

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