

Indian Institute of Technology Madras UGRC -

Prof . **Narayanaswamy N S** and Prof. **Ayon Chakraborty**

By Aditya Viraj Rao Ponugoti
(CS20B005)

DISCRETE EVENT SIMULATION OF THE RAILWAYS

Overview

This part of the RailwaySim project involves taking input data like timetables, data about tracks, data about stations, and information like train engine type and carrying capacity.

Use this data to simulate the railway system with the ability to change factors like train speed, train direction, and track conditions and also have the ability to include new trains, routes and stations.

Do all the above aspects using a discrete event simulator using the API calls for data from the data part of the project and also provide a platform for the machine learning part to train and be able to run the suggestions it gives to see how the simulation differs.

Goals

1. At the start, we are planning to simulate a very basic model of just a single train to run all its stations.
2. Then we will add all the trains running with basic assumptions like all trains go at a constant speed and there are no failures or congestions.
3. Then we plan to add more realistic factors like traffic lights, diversions, tack change and service halts.

4. Add more intriguing features like the number of platforms in the train, engine type of the train, track type and many others.
5. Make the simulation easy and fast to run so as to train the ML algorithm.
6. Ability to inject real-life issues like, for example, injecting a track failure at 9.30 am at a specific location, injecting a caution order at 20kmph at 10.15 am for a segment.

Collaborating with other projects

1. Use data from the DBMS part of the project to run simulations.
2. Send valuable data insights to the ML part of RailwaySim.
3. Allow machine learning predicted factors to apply to the current model and make changes to see if the event goes better.
4. Producing similar data insights to DBMS parts to store and efficiently represent them.

References

Discrete event Simulations, Data Structures

SimPy:

<https://simpy.readthedocs.io/en/latest/>

NS3:

<https://www.nsnam.org/>

<https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwiR2dju9r6AhWfRmwGHRxwD7QQFnoECB4QAQ&url=https%3A%2F%2Fwww.nsnam.org%2Fdocs%2Ftutorial%2Fns-3-tutorial.pdf&usg=AOvVaw3-Xii6SWi29YYz6wsrlZ8G>