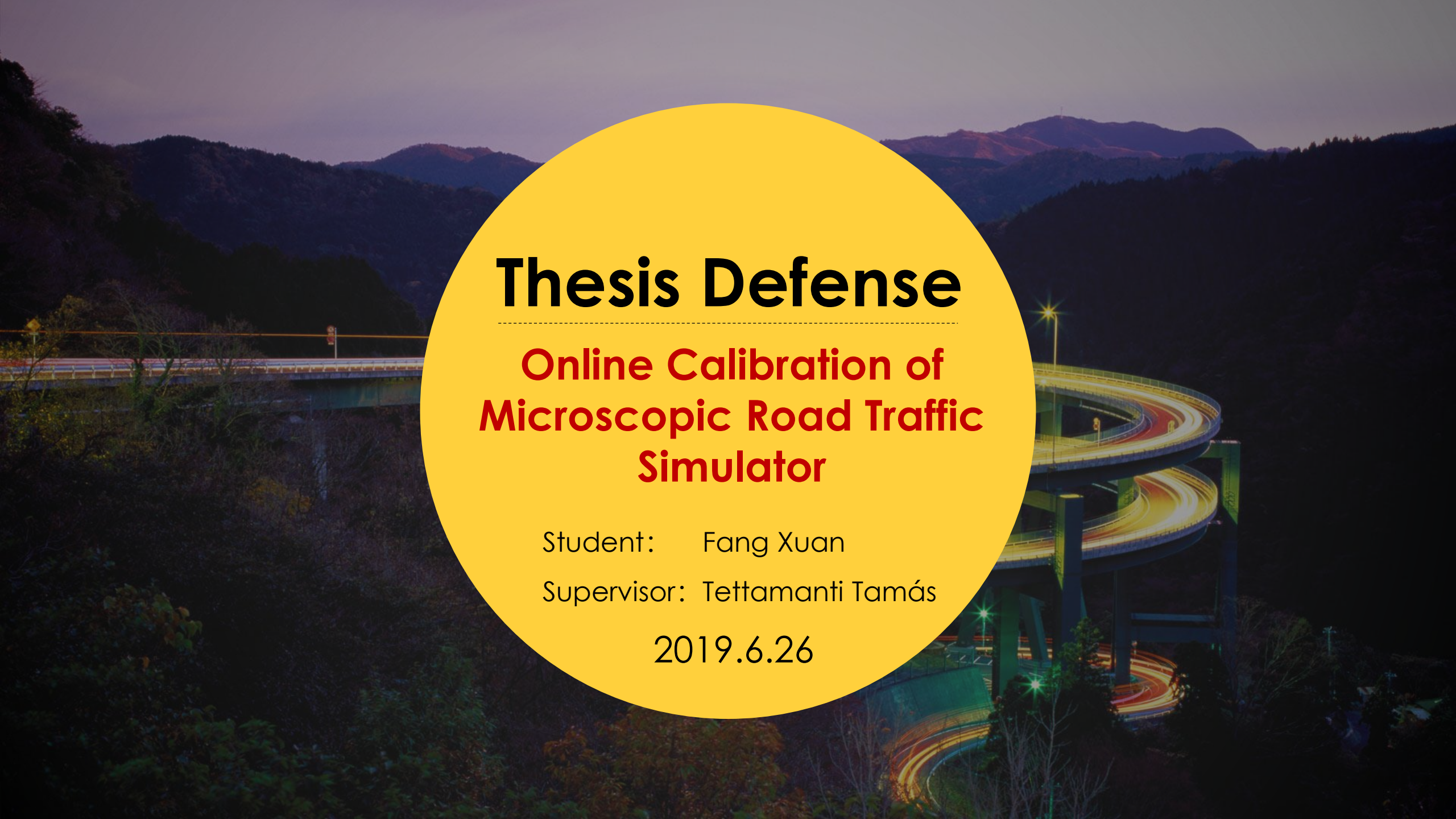


Thesis Defense

Online Calibration of Microscopic Road Traffic Simulator

Student: Fang Xuan

Supervisor: Tettamanti Tamás

2019.6.26

Part 1 Introduction

Part 2 Microscopic Road Traffic Simulator online Calibration

Part 3 Case Study

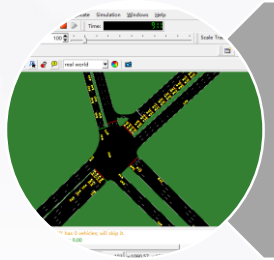
Part 4 Conclusion and further work

Part 1

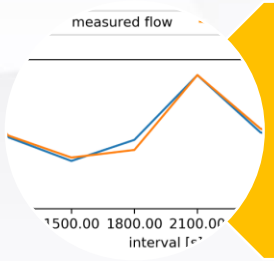
Introduction

Introduction

Problem:
-Rapid growth urban mobility demand



Solution:
-ITS
-Microscopic road traffic simulator



The necessity of microscopic road traffic simulator calibration

Microscopic road traffic simulator

Description

- The simulation of the interaction of models which describing the characteristics and behavior of each unit in the transportation system

How to do

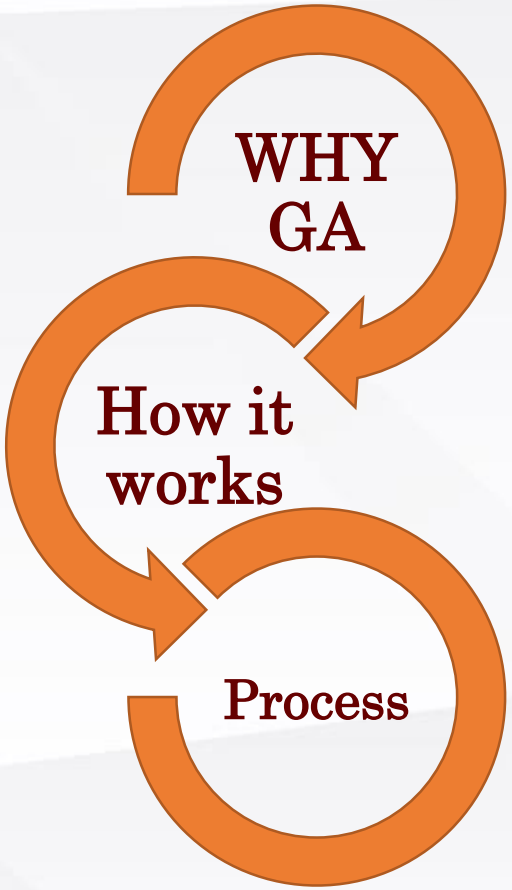
- Detailed traffic data
- Traffic facilities and vehicles operating in the traffic system

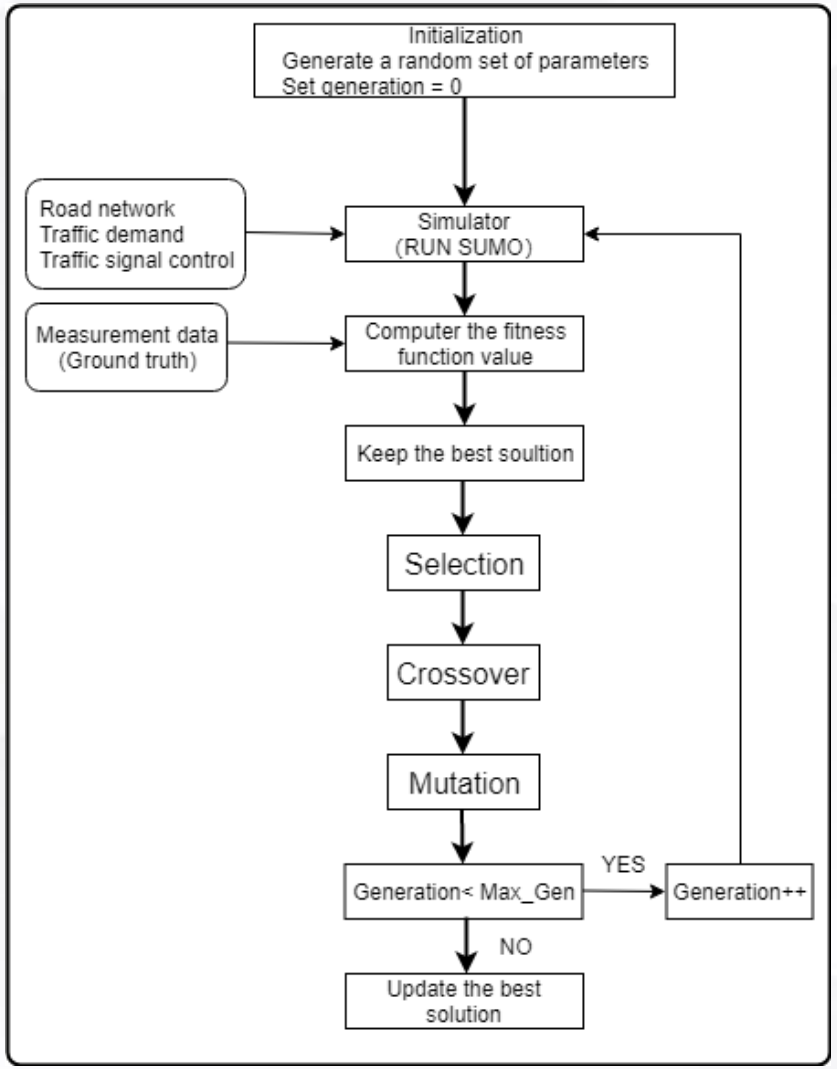
SUMO
SIMULATION OF URBAN MOBILITY

Part 2

Microscopic Road Traffic Simulator online Calibration

Microscopic Road Traffic Simulator online Calibration Implementation





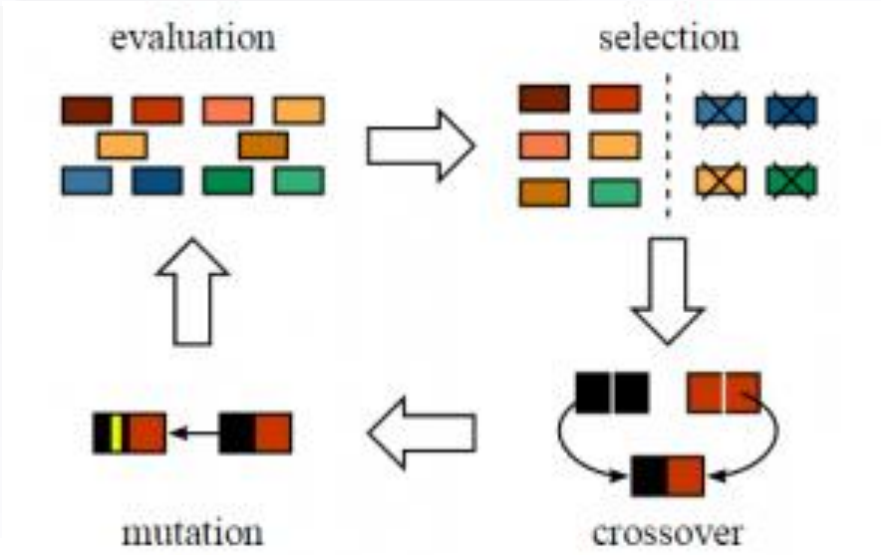
DISTRIBUTED EVOLUTIONARY ALGORITHMS IN PYTHON

Fitness function

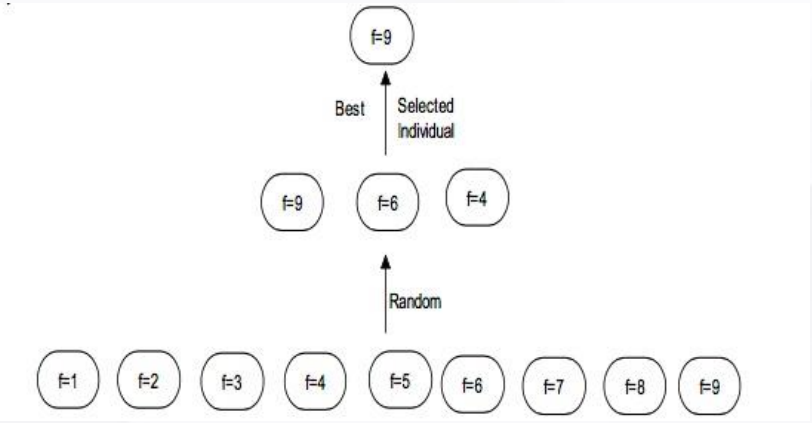
$$min_{Q(k)} \sum_{i=1}^{n} \sqrt{\frac{2\left(\bar{V}_i^{Mea}(k) - \bar{V}_i^{Sim}\left(Q(k)\right)\right)^2}{\bar{V}_i^{Mea}(k) + \bar{V}_i^{Sim}\left(Q(k)\right)}}$$

Microscopic Road Traffic Simulator online Calibration Implementation

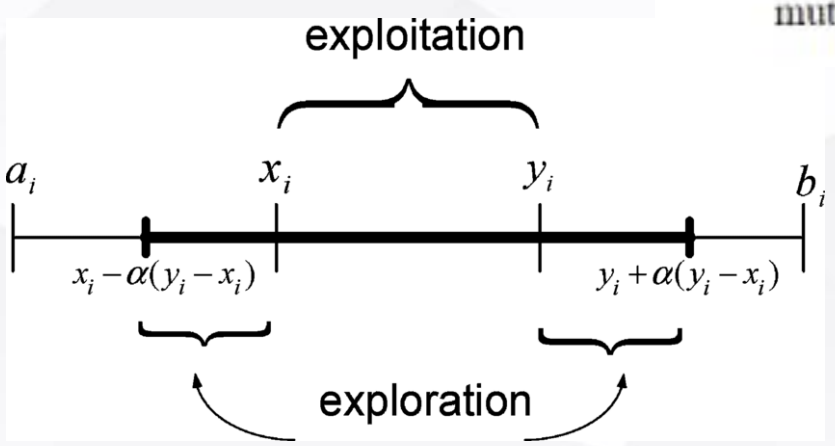

```
toolbox.register("evaluate", evaluate)
toolbox.register("mate", tools.cxBlend,  alpha = 0.1)
toolbox.register("mutate", tools.mutGaussian, mu=0, sigma=5, indpb=0.1)
toolbox.register("new_ind", tools.mutUniformInt, low=1, up=200, indpb=0.4)
toolbox.register("select", tools.selTournament, tournsize=3)
```



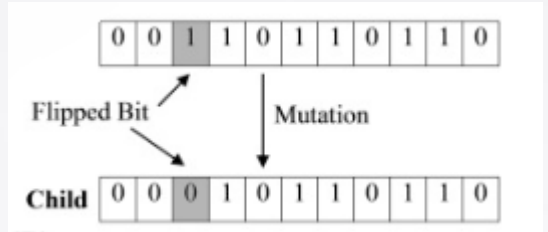
tournament selection



blend crossover



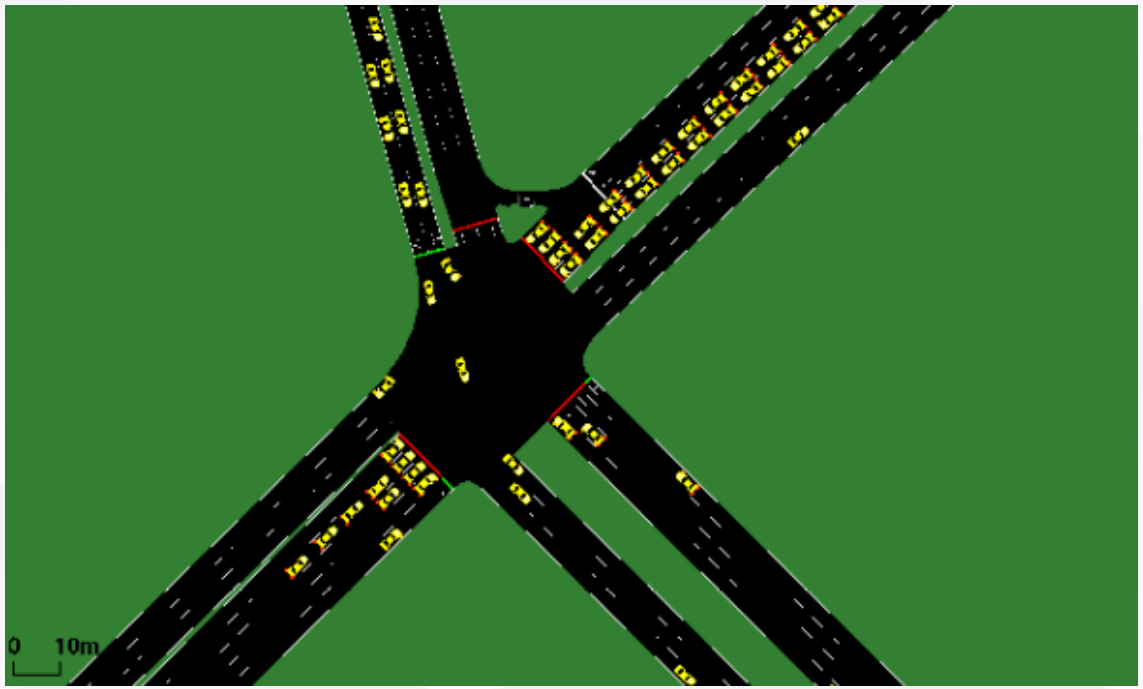
mutation



Part 3

Case Study

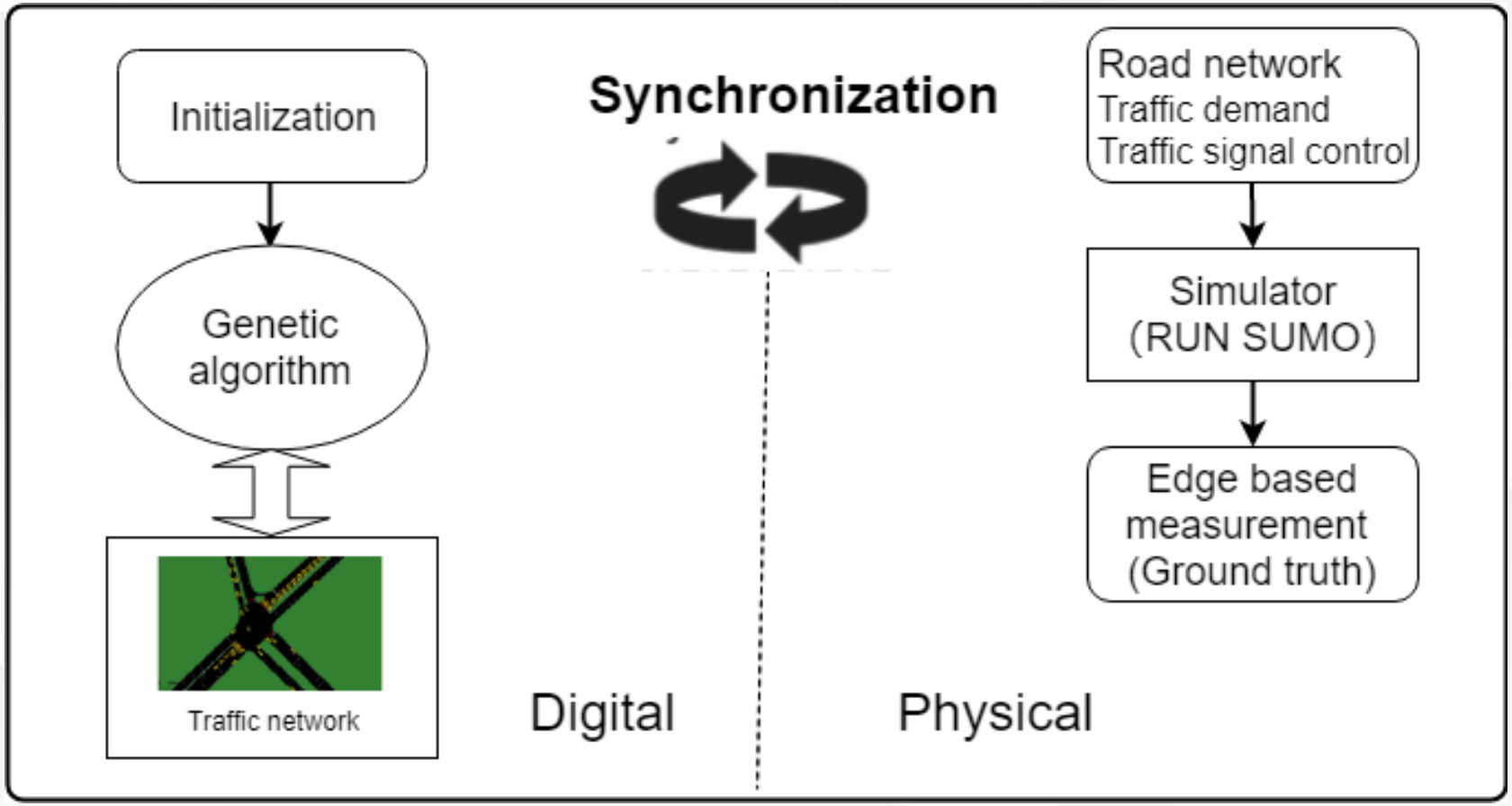
Case study



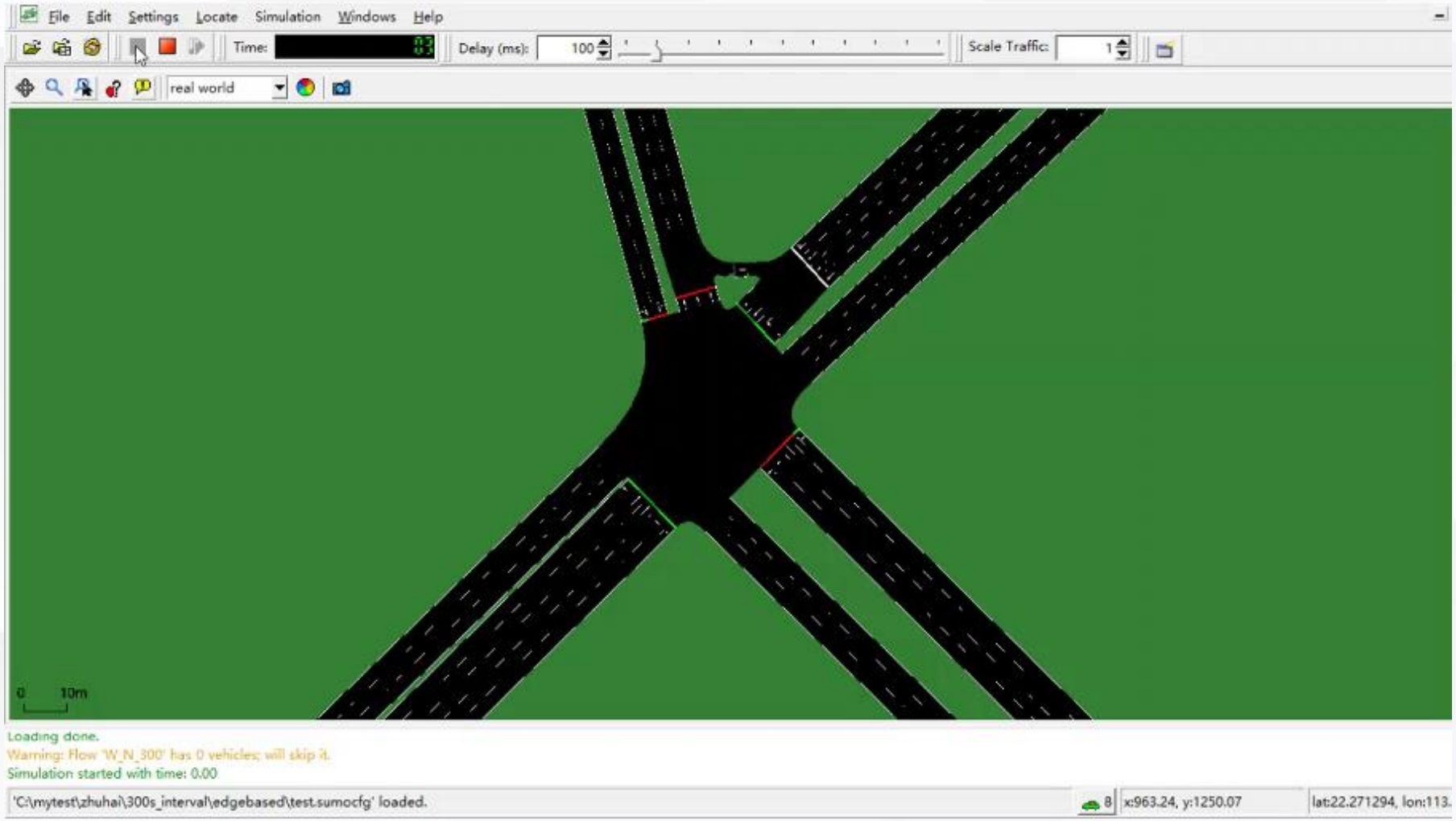
Real world traffic field

Simulated traffic

Case study

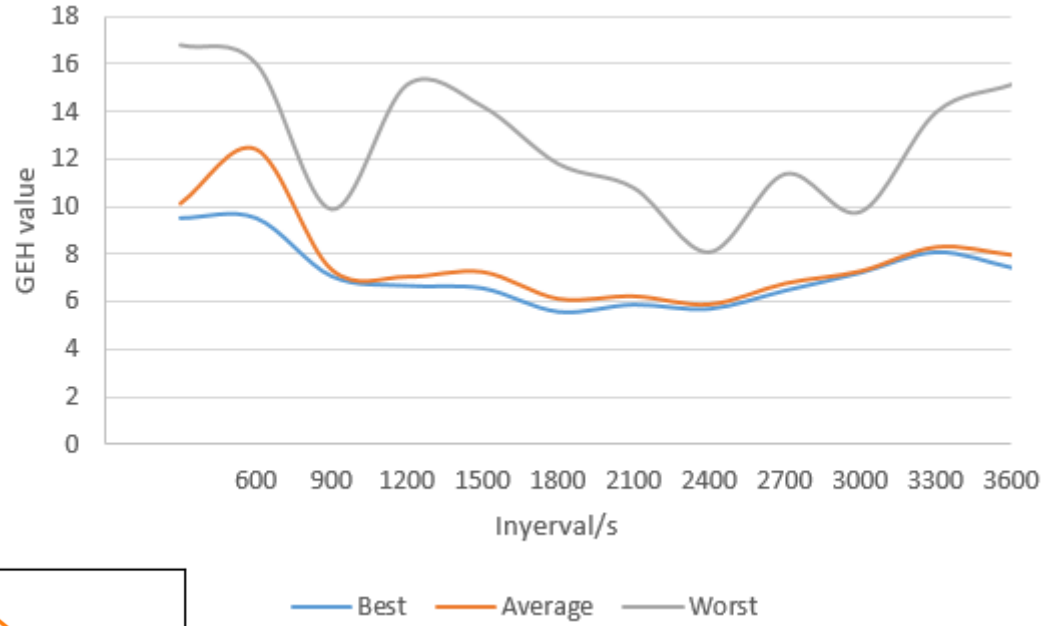

Initialization
Genetic algorithm
Traffic network
Synchronization
Road network
Traffic demand
Traffic signal control
Simulator (RUN SUMO)
Edge based measurement (Ground truth)
Digital
Physical

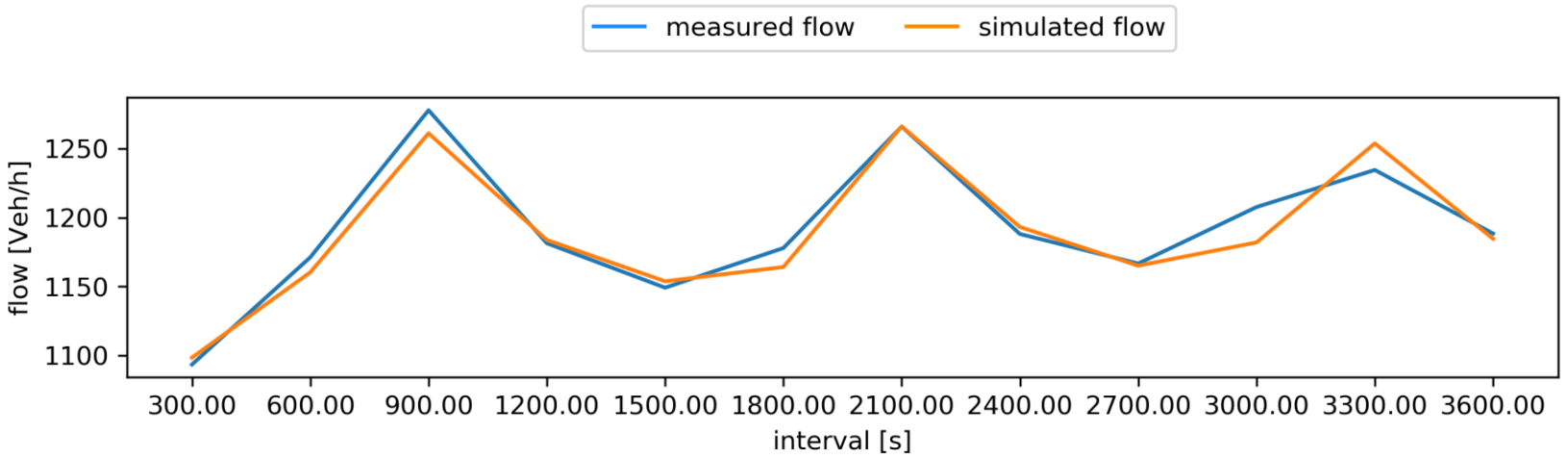
Case study


File Edit Settings Locate Simulation Windows Help
Time:
Delay (ms):
100
Scale Traffic:
1
real world
0 10m
Loading done.
Warning: Flow 'W_N_300' has 0 vehicles; will skip it.
Simulation started with time: 0.00
'C:\mytest\zhuhai\300s_interval\edgebased\test.sumocfg' loaded.
8
x:963.24, y:1250.07
lat:22.271294, lon:113.

Case study

The variation of the GEH





The variation of the GEH

Part 4

Conclusion and further work

Conclusion and further work

Conclusion

- A calibration procedure for a urban network model
- Reasonably replicates the observed traffic flow

Further work

- Potentially applied to calibrate microscopic parameters
- Combine algorithms to provide results


THANK YOU
FOR
WATCHING