Fuzzy Elevator Control

Reference

Intelligent elevator control by ordinal structure fuzzy logic algorithm

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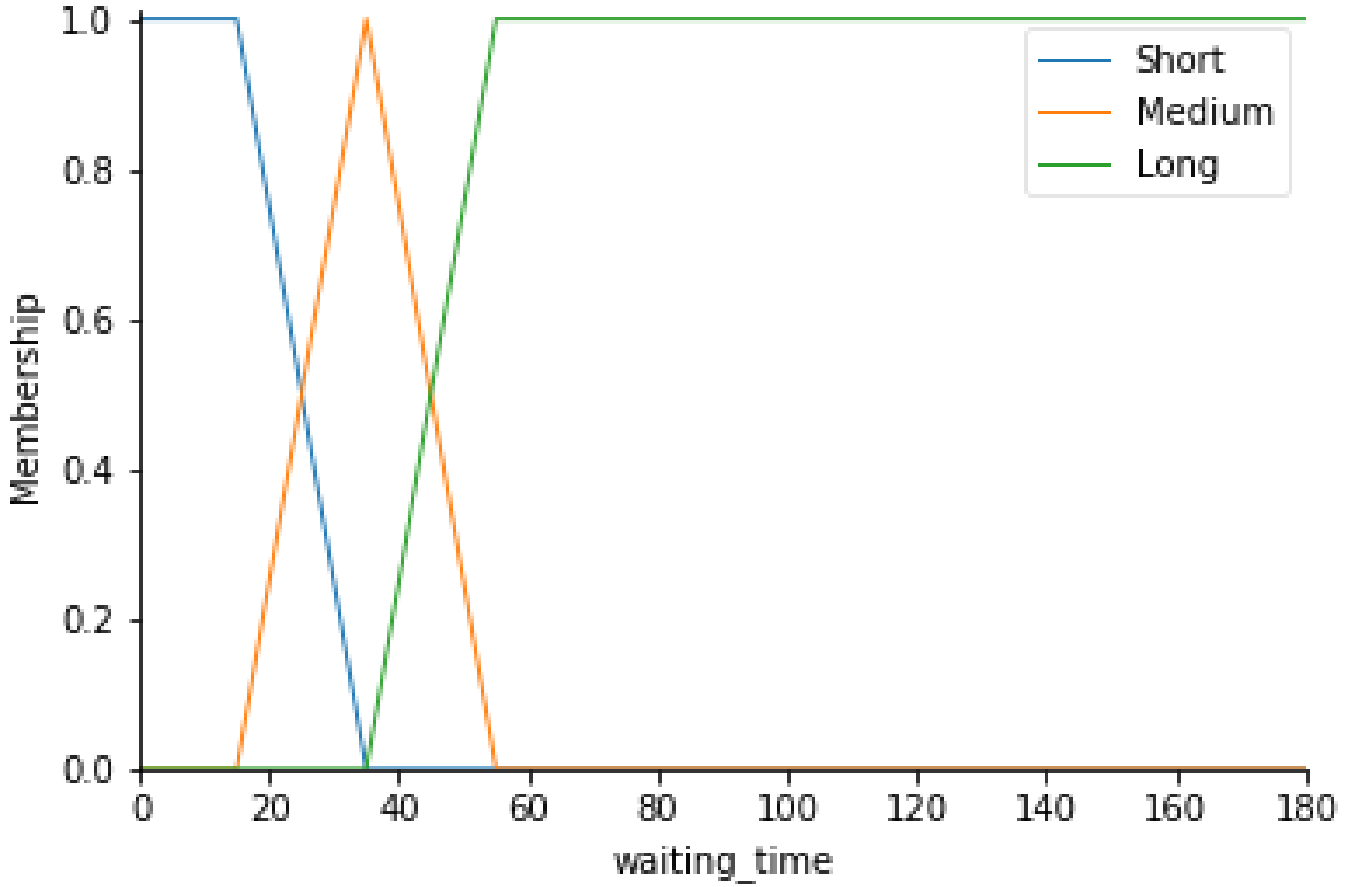
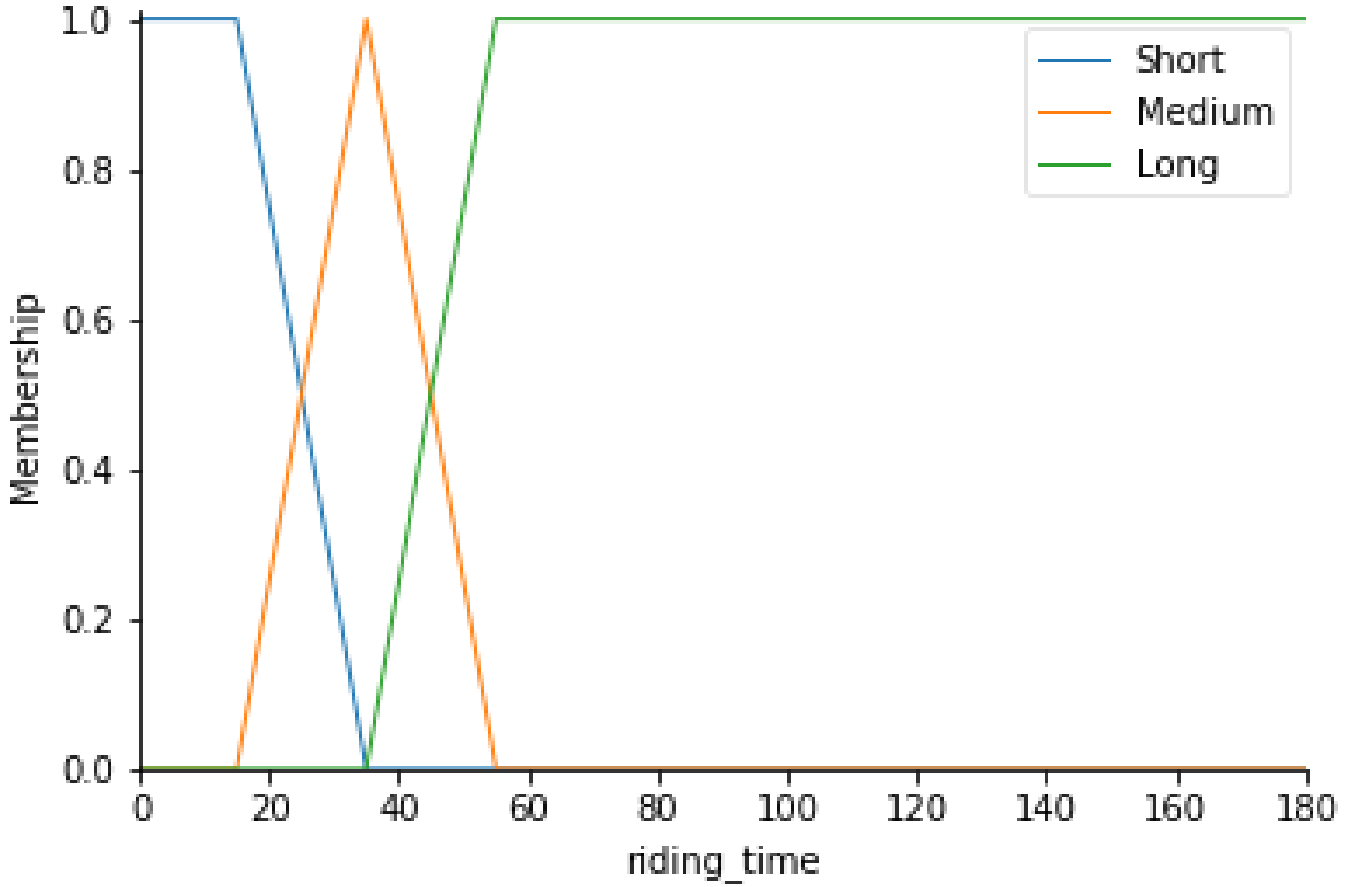
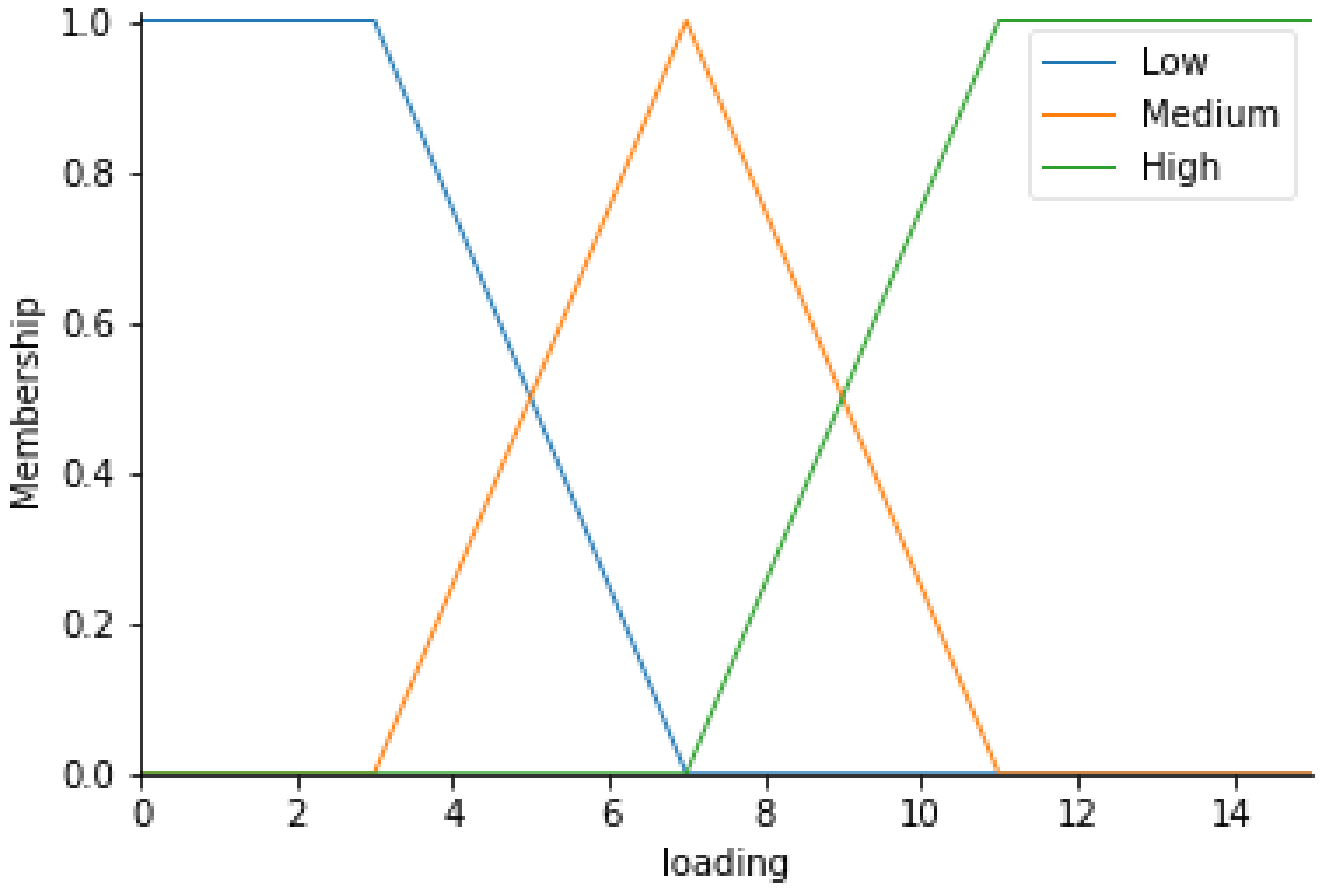
Inputs : waiting time



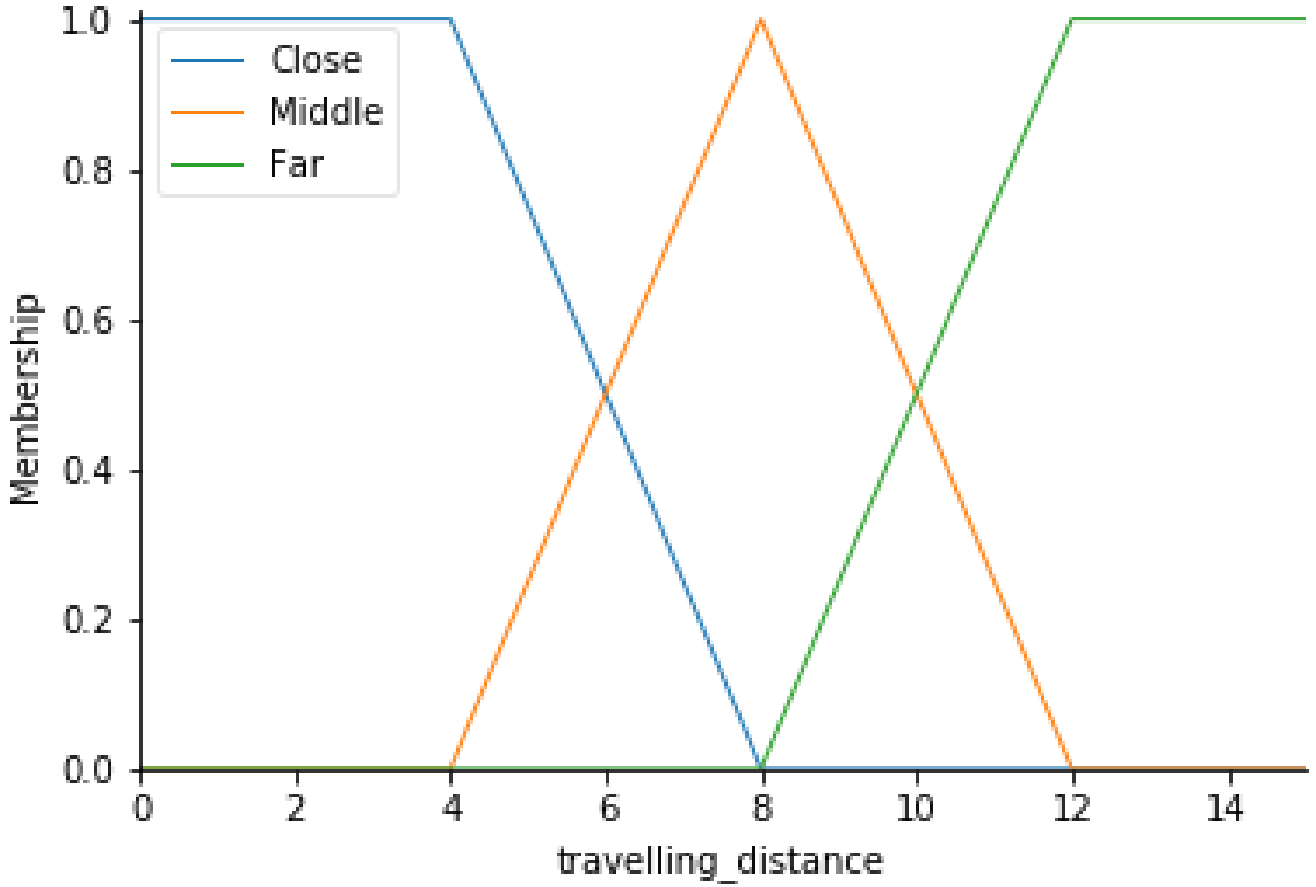
Inputs : riding time



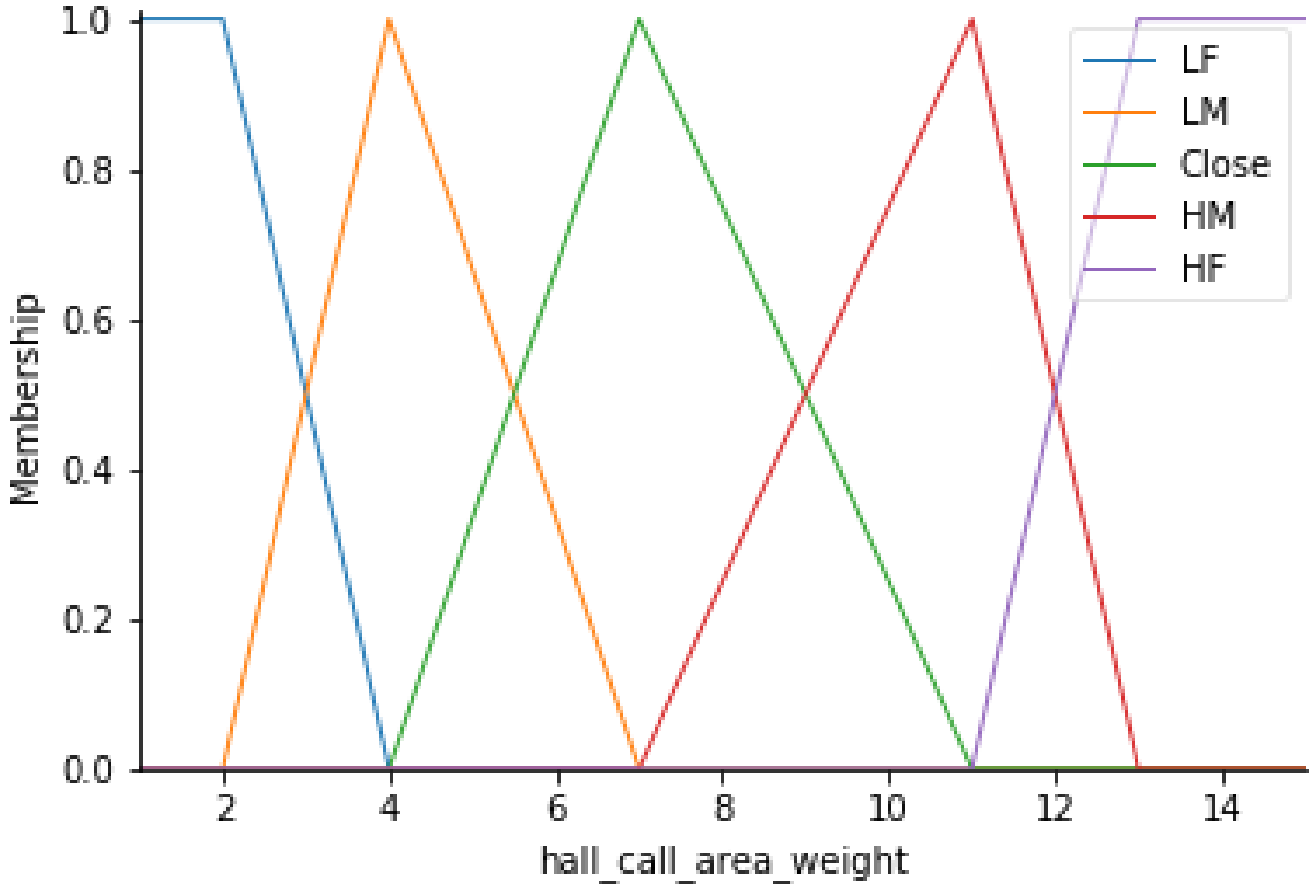
Inputs : loading



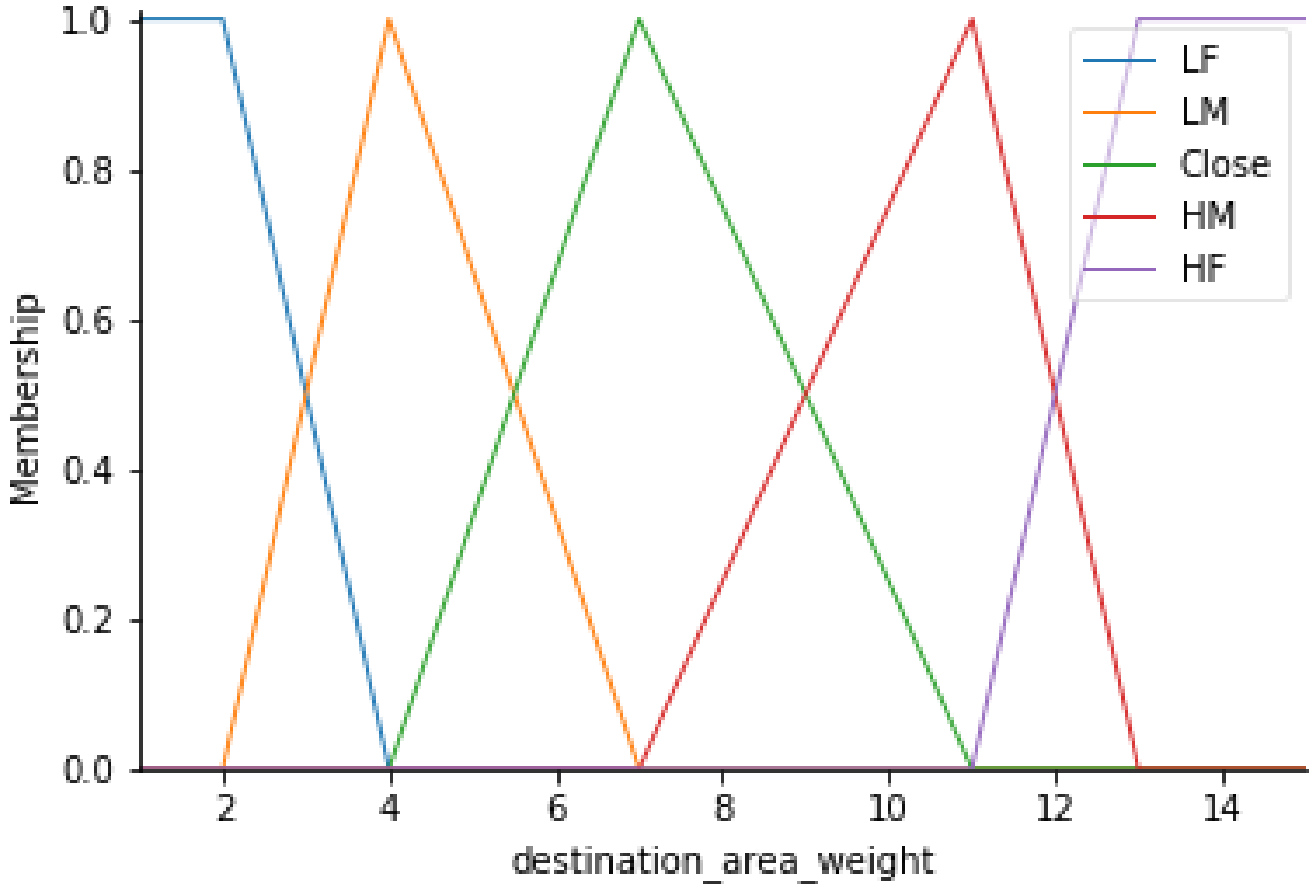
Inputs : travelling distance



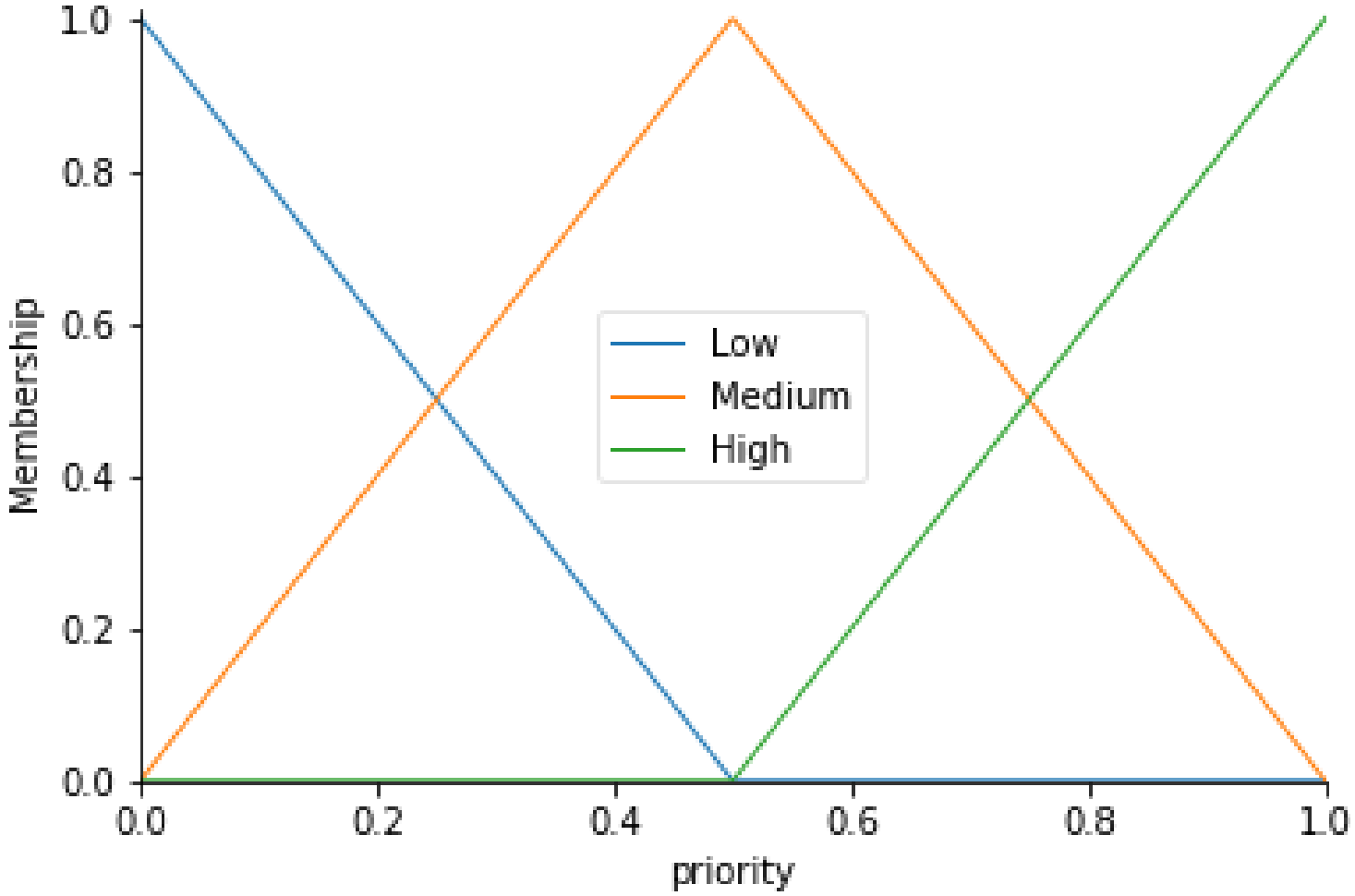
Inputs : hall call area weight



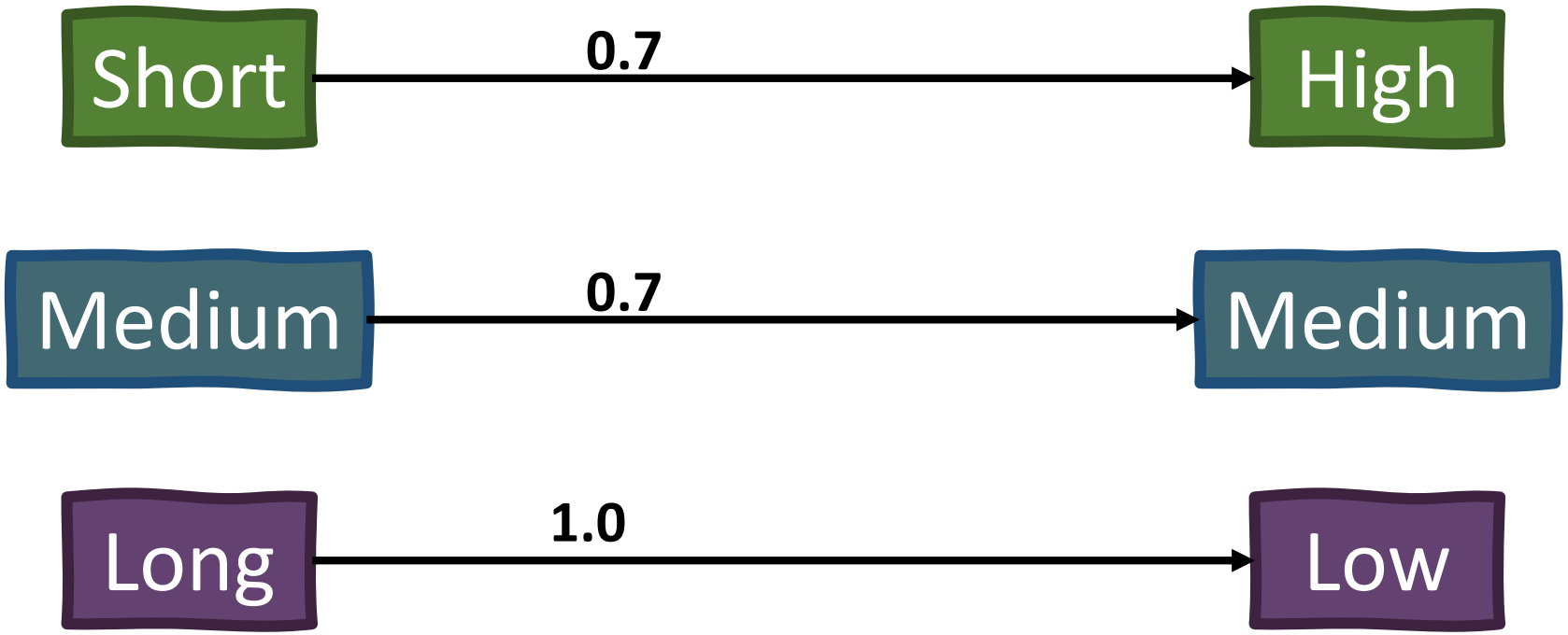
Inputs : destination area weight



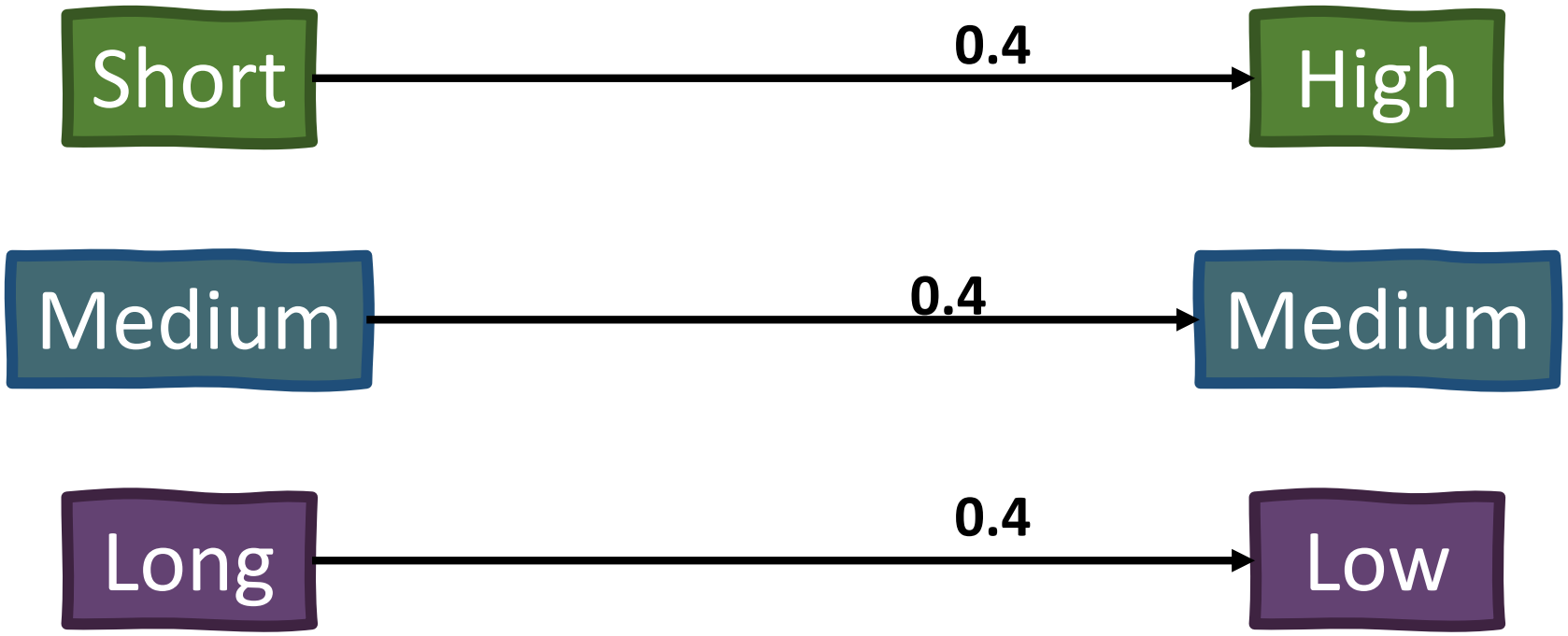
Output : priority



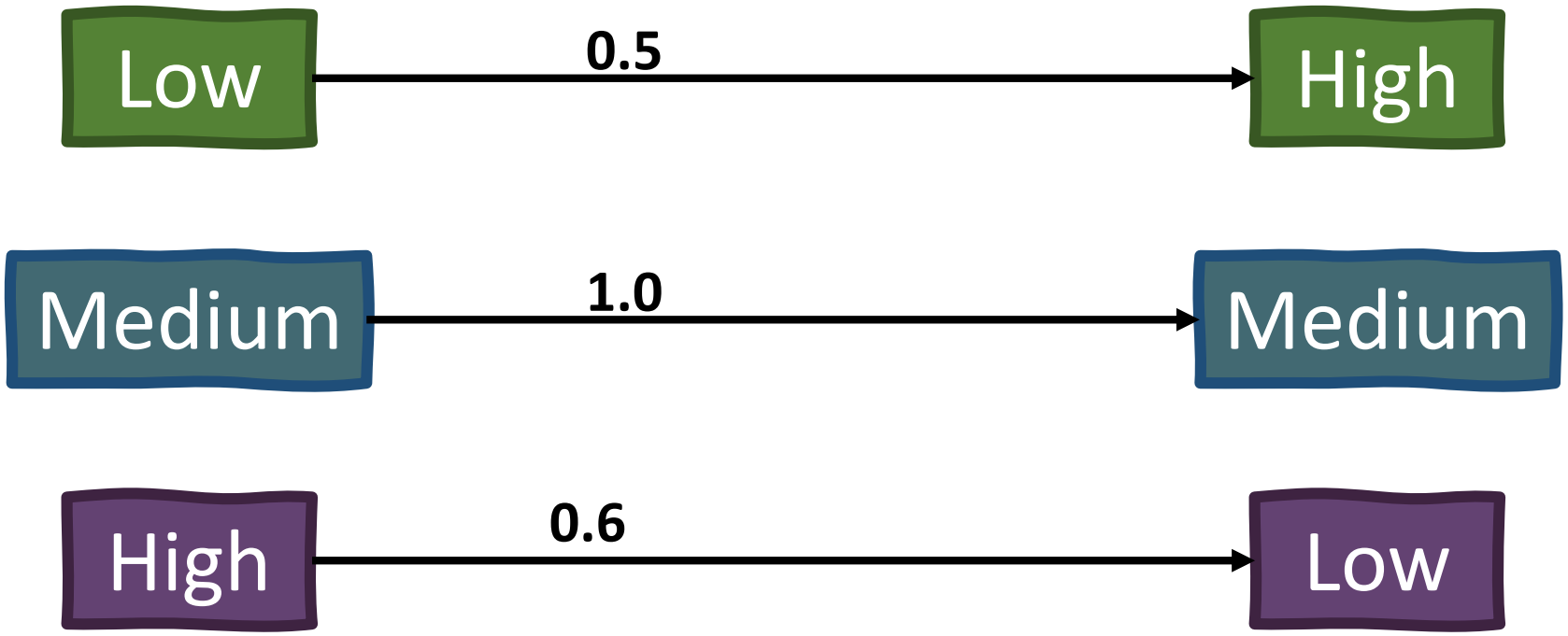
Rules : waiting time -> priority



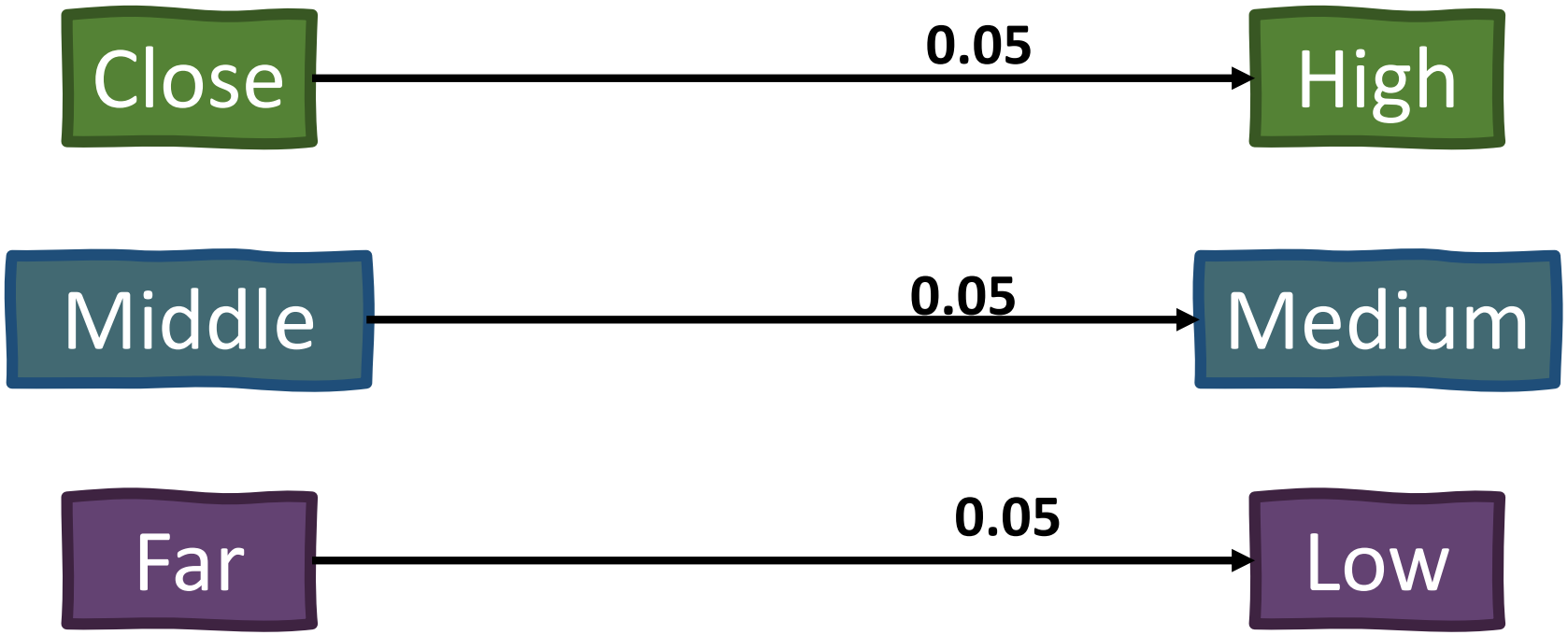
Rules : riding time -> priority



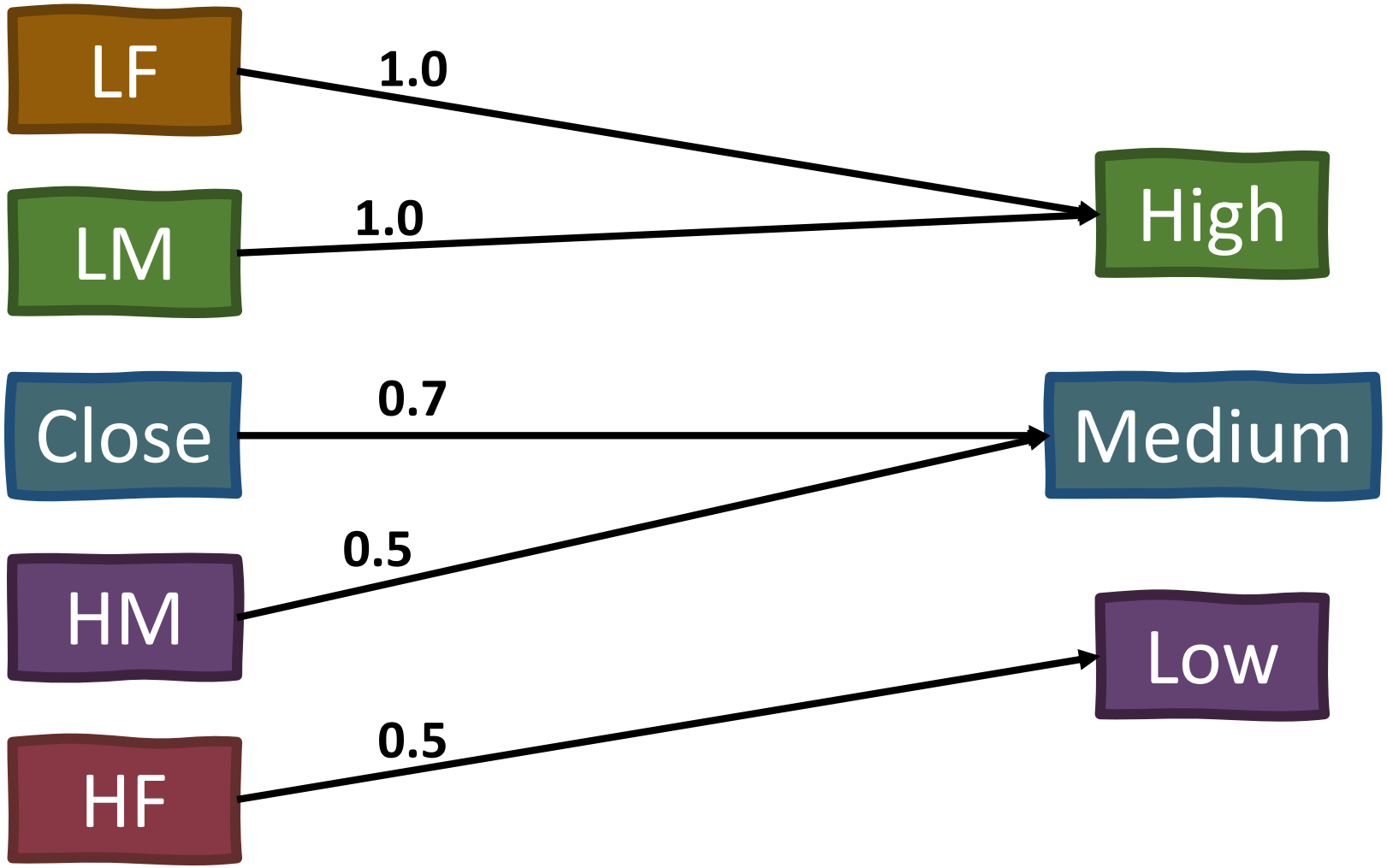
Rules : loading -> priority



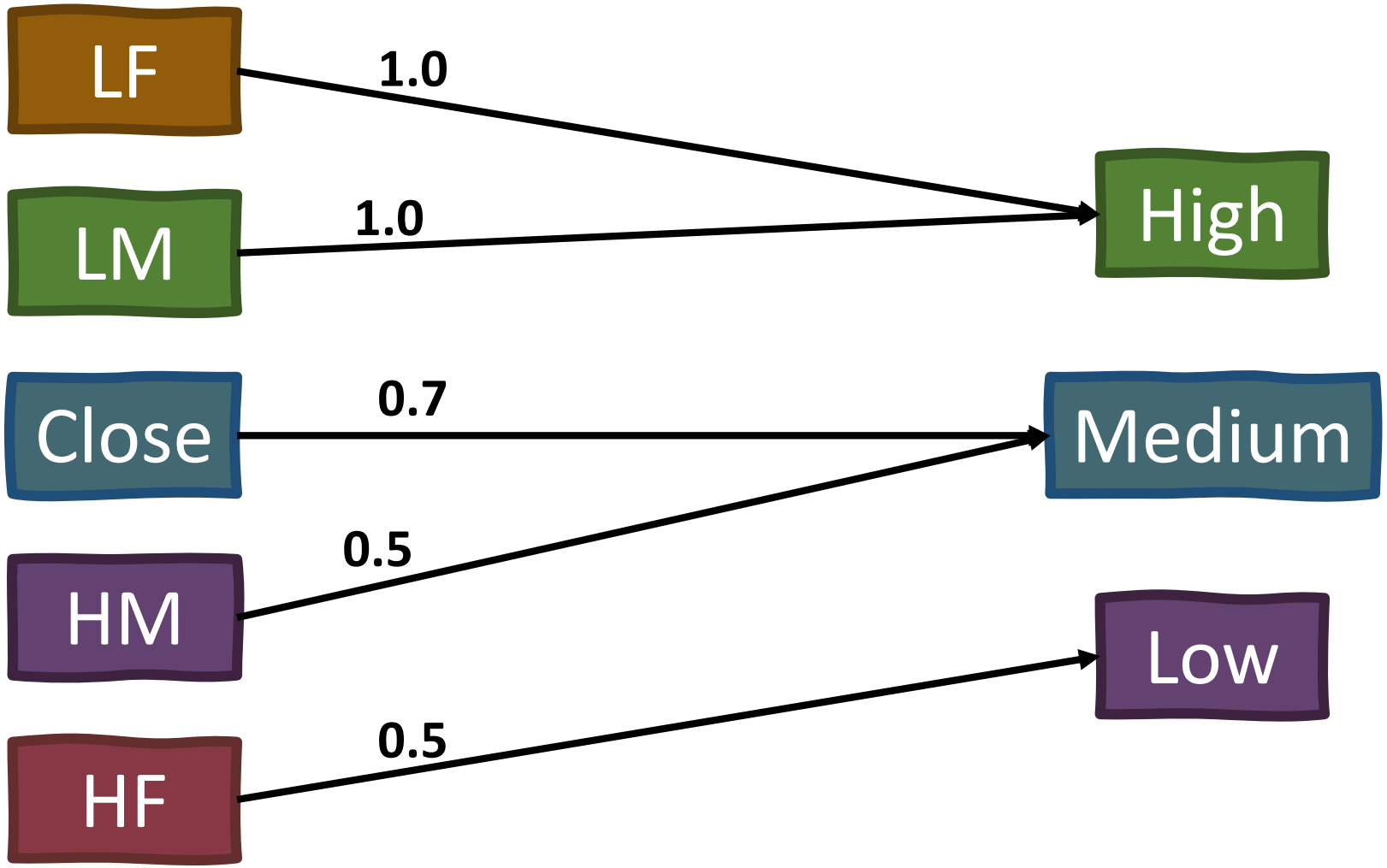
Rules : travelling distance -> priority



Rules : hall call area weight -> priority

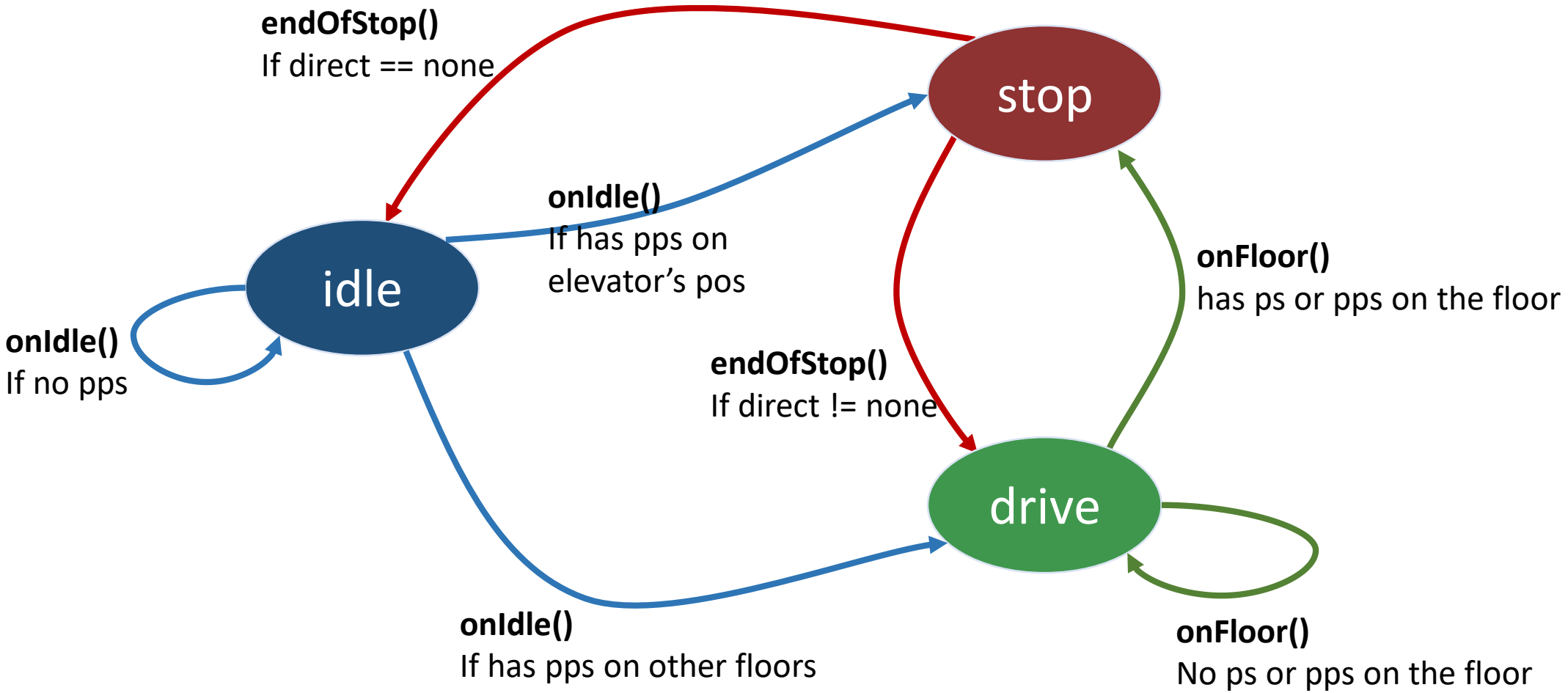


Rules : destination area weight -> priority



Elevator state diagram

ps = passenger(s)
pps = potential passenger(s)
direct = elevator's direction
pos = elevator's position

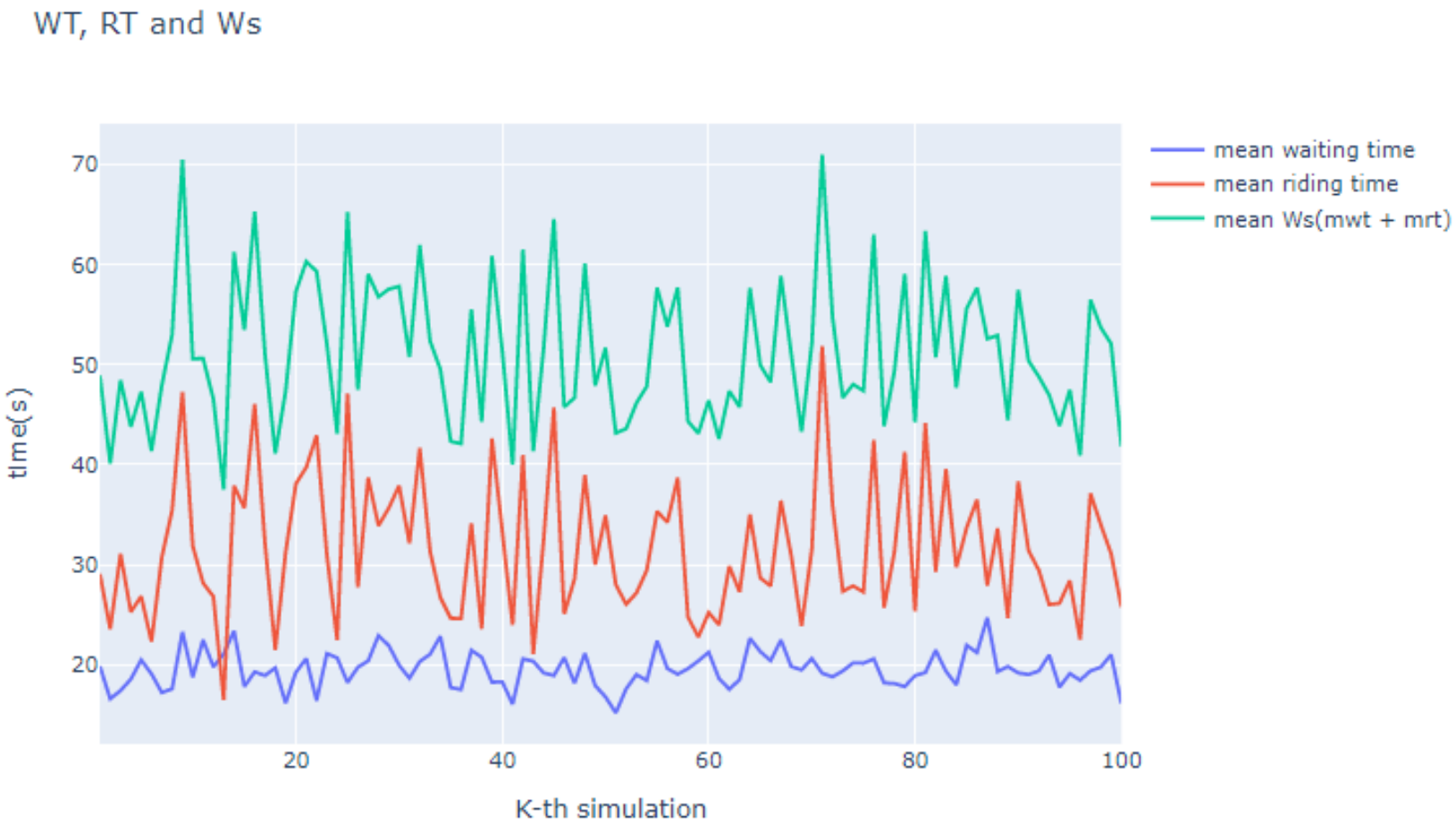


Simulation

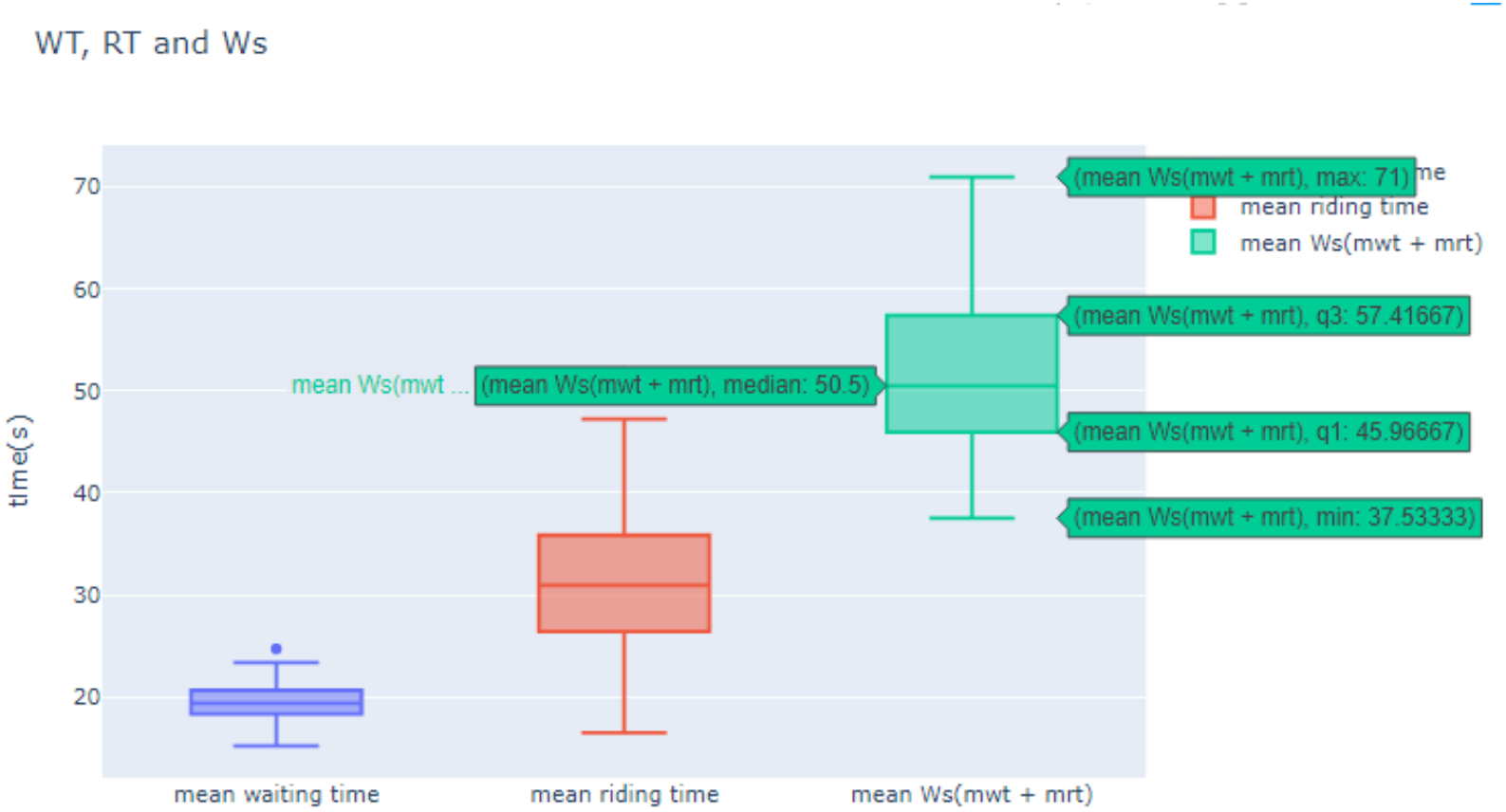
Step : (in file simulator.ipynb)

1. 設定 *NUM_OF_PS* 表示總共產生幾組乘客
2. 設定 *psfreq* 表示乘客來到的頻率(s)
3. 設定 *K* 表示此次實驗重複K次模擬
4. 決定函式 ***simulate*** 的第一個參數:*useFec*，True表示使用fuzzy logic(default)
5. 執行並產生圖表

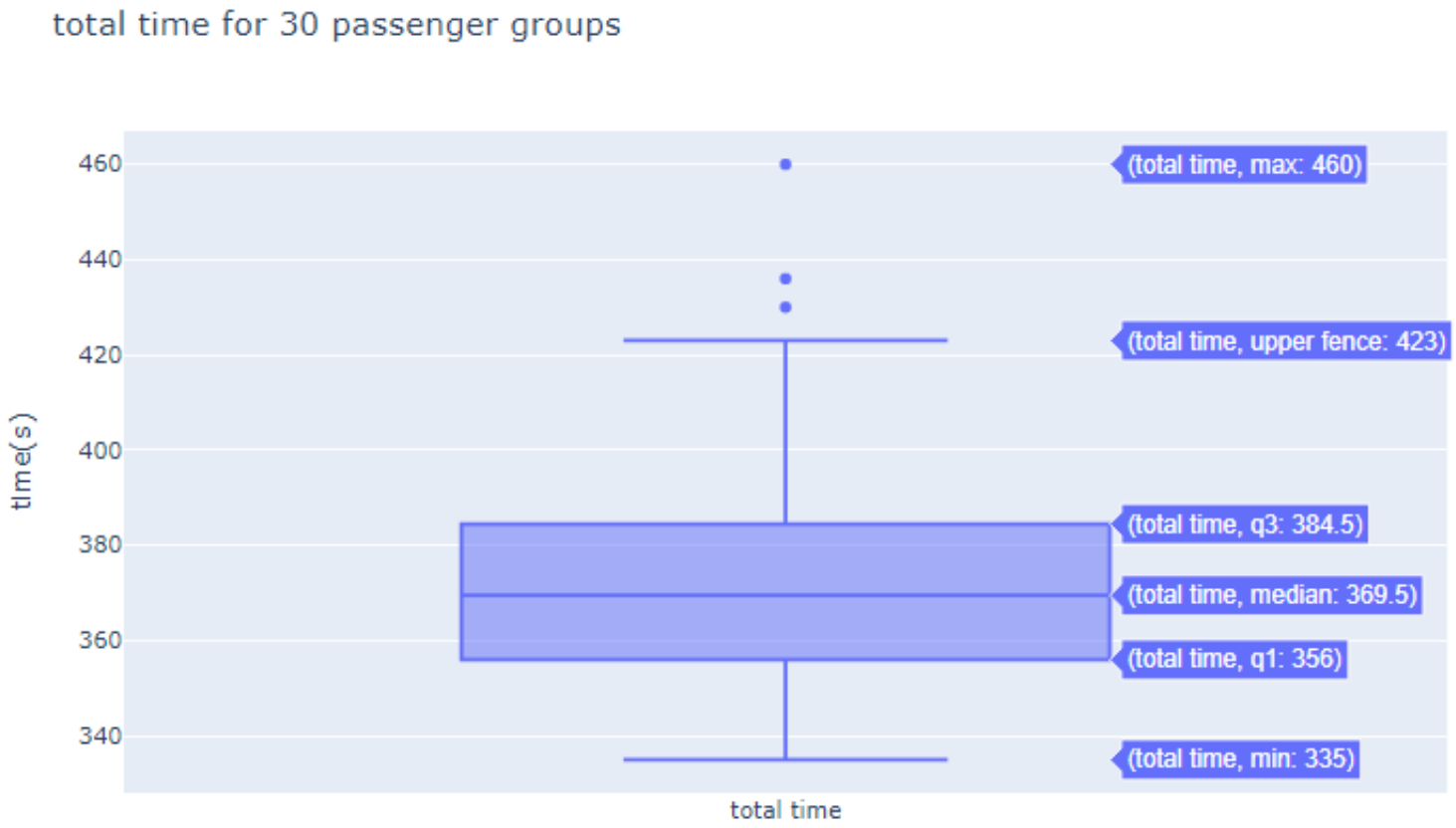
Result


WT, RT and Ws
time(s)
70
60
50
40
30
20
20
40
60
80
100
K-th simulation
mean waiting time
mean riding time
mean Ws(mwt + mrt)

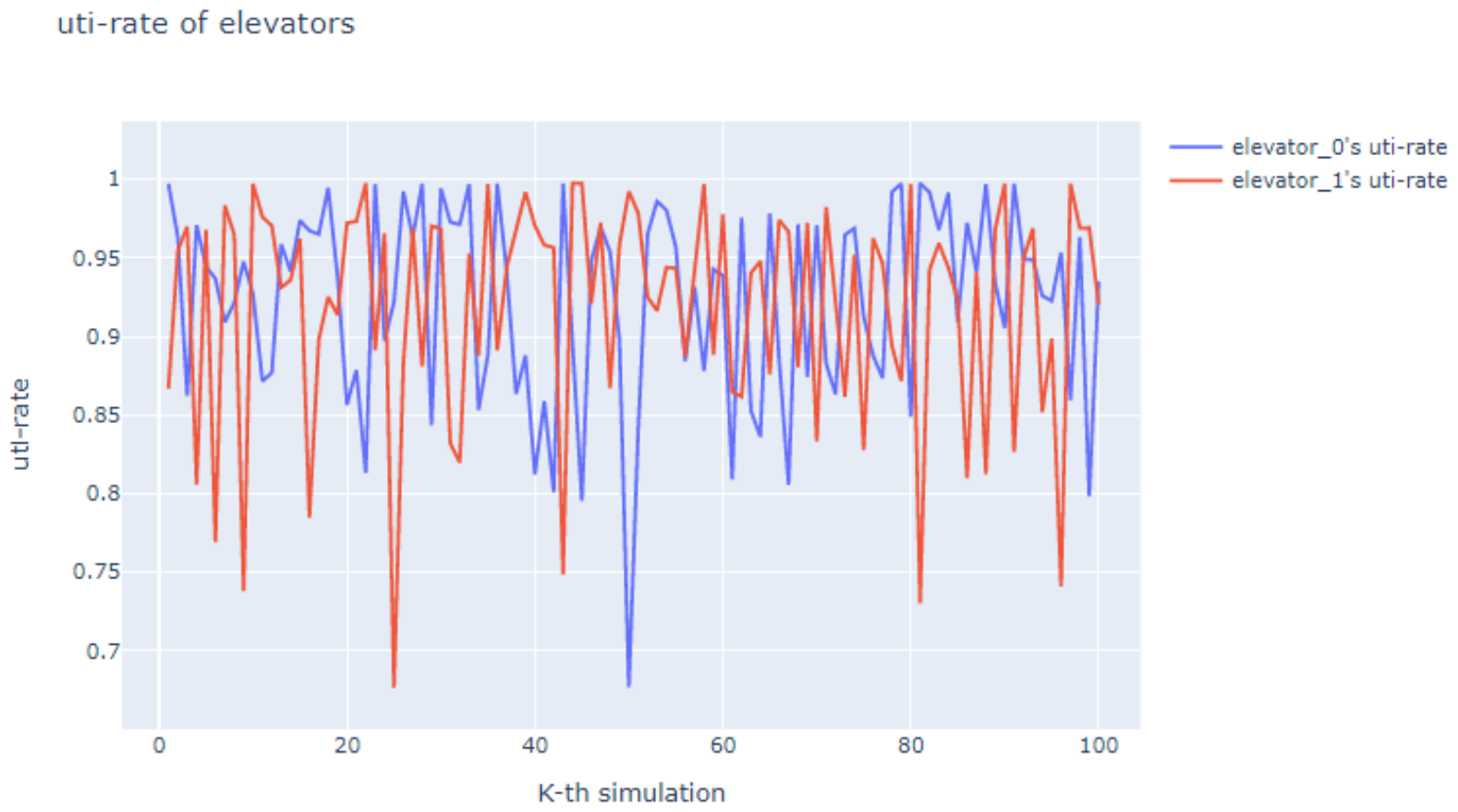
Result


WT, RT and Ws
time(s)
70
60
50
40
30
20
mean Ws(mwt ...
(mean Ws(mwt + mrt), median: 50.5)
(mean Ws(mwt + mrt), max: 71)
mean riding time
mean Ws(mwt + mrt)
(mean Ws(mwt + mrt), q3: 57.41667)
(mean Ws(mwt + mrt), q1: 45.96667)
(mean Ws(mwt + mrt), min: 37.53333)
mean waiting time
mean riding time
mean Ws(mwt + mrt)

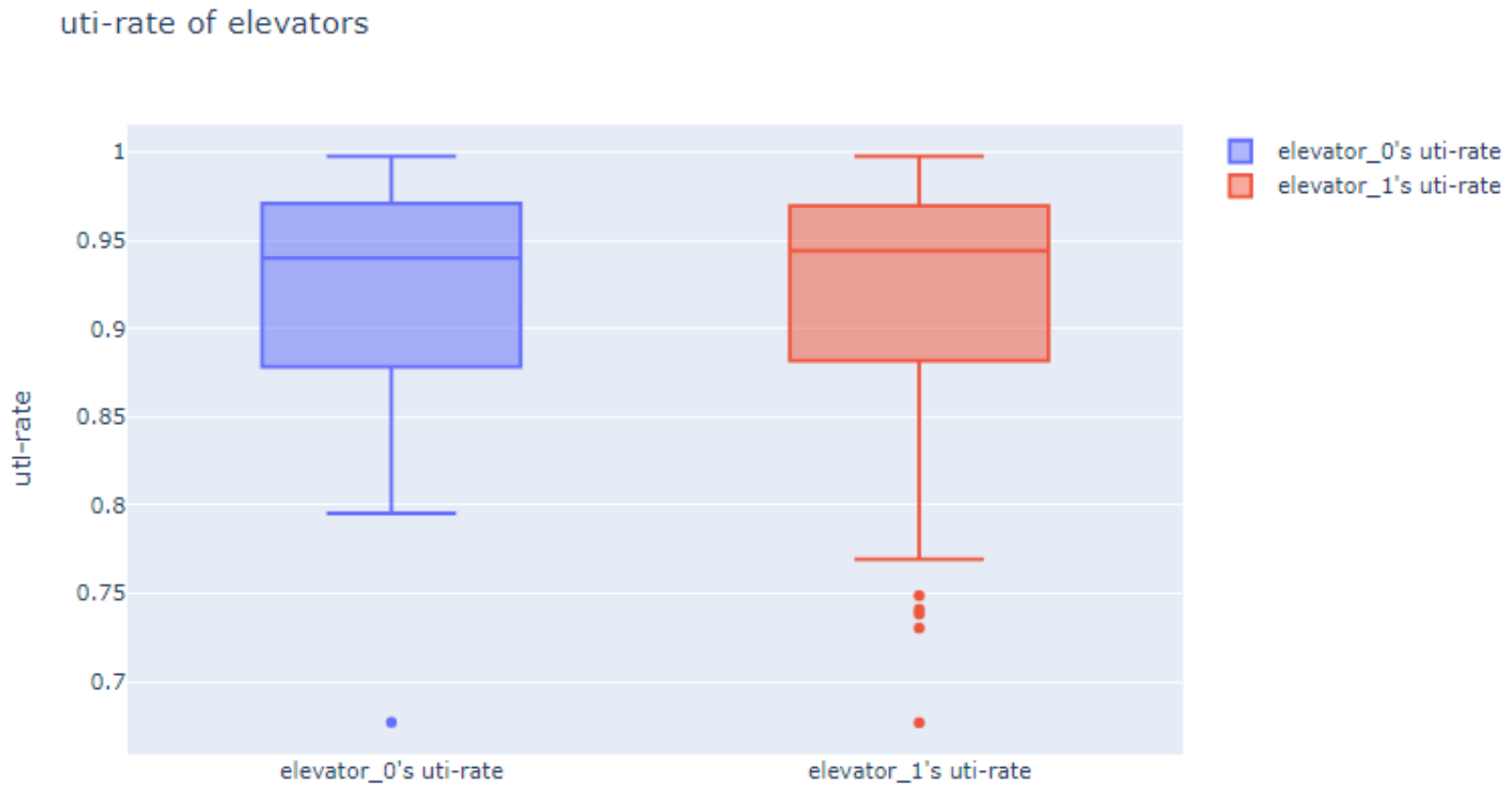
Result


total time for 30 passenger groups
460
440
420
400
380
360
340
time(s)
total time
(total time, max: 460)
(total time, upper fence: 423)
(total time, q3: 384.5)
(total time, median: 369.5)
(total time, q1: 356)
(total time, min: 335)

Result


uti-rate of elevators
elevator_0's uti-rate
elevator_1's uti-rate
uti-rate
1
0.95
0.9
0.85
0.8
0.75
0.7
0
20
40
60
80
100
K-th simulation

Result


uti-rate of elevators
uti-rate
1
0.95
0.9
0.85
0.8
0.75
0.7
elevator_0's uti-rate
elevator_1's uti-rate
elevator_0's uti-rate
elevator_1's uti-rate