How to use dynamic lambda and mu in CTM\_GMNS

Step 1, using Excel or Python to generate dynamic lambda and mu. For example, lambda yields to following formula:



Here, we assume that:



Then, we can obtain dynamic lambda of t by Excel. The lambda is updated per 5 minutes. Curve of the lambda is shown in the table below.

|  |  |
| --- | --- |
| t | lambda\_cubic |
| 7 | 1800 |
| 7.083333333 | 1931.770833 |
| 7.166666667 | 2029.166667 |
| 7.25 | 2095.3125 |
| 7.333333333 | 2133.333333 |
| 7.416666667 | 2146.354167 |
| 7.5 | 2137.5 |
| 7.583333333 | 2109.895833 |
| 7.666666667 | 2066.666667 |
| 7.75 | 2010.9375 |
| 7.833333333 | 1945.833333 |
| 7.916666667 | 1874.479167 |
| 8 | 1800 |
| 8.083333333 | 1725.520833 |
| 8.166666667 | 1654.166667 |
| 8.25 | 1589.0625 |
| 8.333333333 | 1533.333333 |
| 8.416666667 | 1490.104167 |
| 8.5 | 1462.5 |
| 8.583333333 | 1453.645833 |
| 8.666666667 | 1466.666667 |
| 8.75 | 1504.6875 |
| 8.833333333 | 1570.833333 |
| 8.916666667 | 1668.229167 |
| 9 | 1800 |

Step 2, transforming the obtained dynamic lambda table to demand.csv.

|  |  |  |
| --- | --- | --- |
| time | corridor\_id | demand |
| 0 | Corridor-1 | 1800 |
| 1 | Corridor-1 | 1931.770833 |
| 2 | Corridor-1 | 2029.166667 |
| 3 | Corridor-1 | 2095.3125 |
| 4 | Corridor-1 | 2133.333333 |
| 5 | Corridor-1 | 2146.354167 |
| 6 | Corridor-1 | 2137.5 |
| 7 | Corridor-1 | 2109.895833 |
| 8 | Corridor-1 | 2066.666667 |
| 9 | Corridor-1 | 2010.9375 |
| 10 | Corridor-1 | 1945.833333 |
| 11 | Corridor-1 | 1874.479167 |
| 12 | Corridor-1 | 1800 |
| 13 | Corridor-1 | 1725.520833 |
| 14 | Corridor-1 | 1654.166667 |
| 15 | Corridor-1 | 1589.0625 |
| 16 | Corridor-1 | 1533.333333 |
| 17 | Corridor-1 | 1490.104167 |
| 18 | Corridor-1 | 1462.5 |
| 19 | Corridor-1 | 1453.645833 |
| 20 | Corridor-1 | 1466.666667 |
| 21 | Corridor-1 | 1504.6875 |
| 22 | Corridor-1 | 1570.833333 |
| 23 | Corridor-1 | 1668.229167 |
| 24 | Corridor-1 | 1800 |

Step 3, change value of variable “time\_to\_update\_demand”. This variable represents frequency of the program read next row of demand.csv. For example, if time\_to\_update\_demand is 50 and time\_tick is 6, it means that the program will update demand every 300 seconds.

Step IF, editing supply.csv for obtaining dynamic mu. One can edit time\_period column to change time period that the program update mu.

For example, time\_period column is defined as: 0600\_0615 means that time period is 15 minutes. One can change it as: 0600\_0605 for synchronizing the time period of updating lambda an mu.

Note:

Please note that total simulation time is determined by supply.csv. That is, if you want run a simulation starts at 7 a.m. and ends at 9 a.m., you must change the first row of all links as 0700\_07xx in supply.csv.