**Instructions for visualizing vehicle trajectories as space-time diagrams using NeXTA**

NGSIM data set

Version 1: Prepared by Xuesong (Simon) Zhou

<https://www.youtube.com/@dlsim-mrm2898> [DLSim-MRM - YouTube](https://www.youtube.com/@dlsim-mrm2898)

maintained by Cafer Avci

Version 2 and revision made by Pan Shang, Zanyang Cui and Roy Luo

Package : <https://github.com/asu-trans-ai-lab/NeXTA4GMNS/blob/gh-pages/2Dtrajectory_visulization/NeXTA4_Trajectory_package.zip>

|  |  |  |
| --- | --- | --- |
| Category | File | Remark |
| Main program | NEXTA\_4\_Trajectory.exe | Open source NEXTA visualization tool |
| Input | trajectories-0400-0415 | Sample file from NGSIM |
| Input | test\_one\_line  test\_two\_lines | Sample file from Pan Shang, for one vehicle’s trajectory |
| Output | Trajectory.csv | Export to more user readable format |

# About Next Generation Simulation (NGSIM)

<https://ops.fhwa.dot.gov/trafficanalysistools/ngsim.htm>

# 2. Install and Data Format

Download the NeXTA tool (NEXTA\_4\_Trajectory.exe) from

<https://github.com/asu-trans-ai-lab/NeXTA4GMNS>

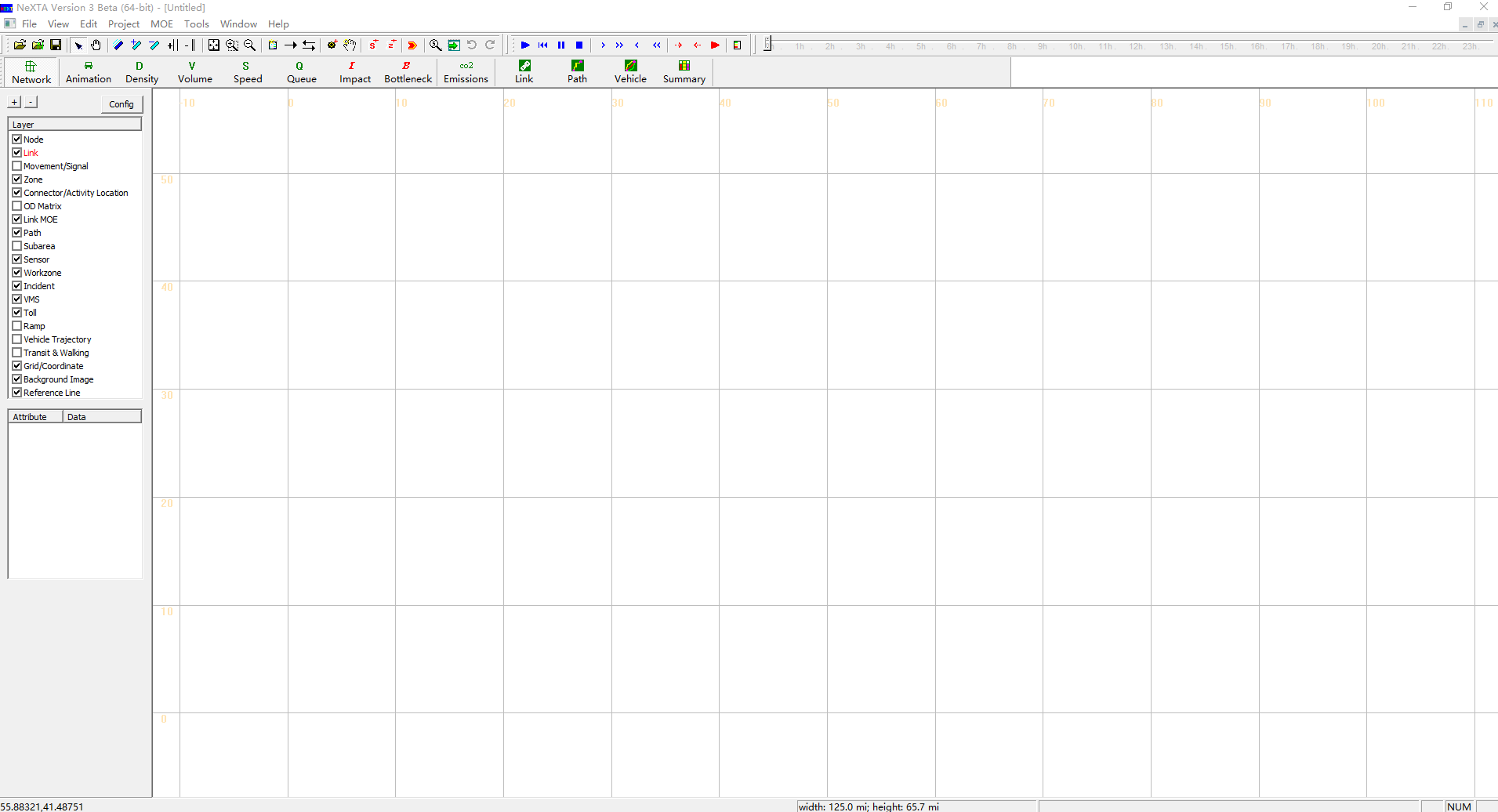
The vehicle trajectory information is stored in the text file with a ‘.txt’ extension and each line represents a record of a car’s trajectory/path. The fields should be separated by either a space or a comma. The column field are listed below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No | Field Name | Example 1 | Example 2 | Unit | remark |
| 1 | Vehicle\_ID | 1 | 1 |  |  |
| 2 | Frame\_ID | 12 | 13 |  | 0.1 seconds |
| 3 | Total\_Frames | 884 | 884 |  | 0.1 seconds |
| 4 | Global\_Time | 1113433136100 | 1113433136200 |  | any value but likely to be unix timestamp |
| 5 | Local\_X | 16.884 | 16.938 |  | not used in NeXA |
| 6 | Local\_Y | 48.213 | 49.463 | feet |  |
| 7 | Global\_X | 6042842.116 | 6042842.012 |  | not used in NeXTA |
| 8 | Global\_Y | 2133117.662 | 2133118.909 |  | not used in NeXTA |
| 9 | Vehicle\_Length | 14.3 | 14.3 | feet |  |
| 10 | Vehicle\_Width | 6.4 | 6.4 | feet |  |
| 11 | Vehicle\_Class | 2 | 2 |  | passenger car or truck |
| 12 | Vehicle\_Velocity | 12.5 | 12.5 |  |  |
| 13 | Vehicle\_Acceleration | 0 | 0 |  |  |
| 14 | Lane\_Identification | 2 | 2 |  | important |
| 15 | Preceding\_Vehicle | 0 | 0 |  |  |
| 16 | Following\_Vehicle | 0 | 0 |  |  |
| 17 | Spacing | 0 | 0 |  |  |
| 18 | Headway | 0 | 0 |  |  |

# 2. Quick Start

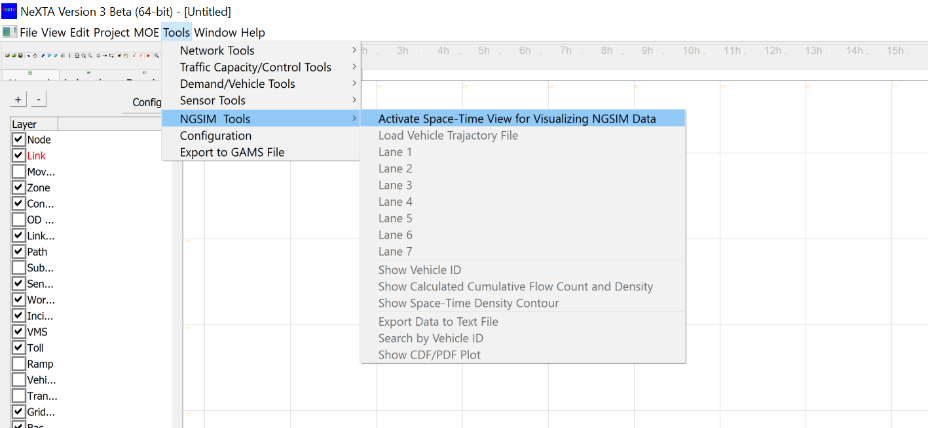
## 2.1 Open NeXTA

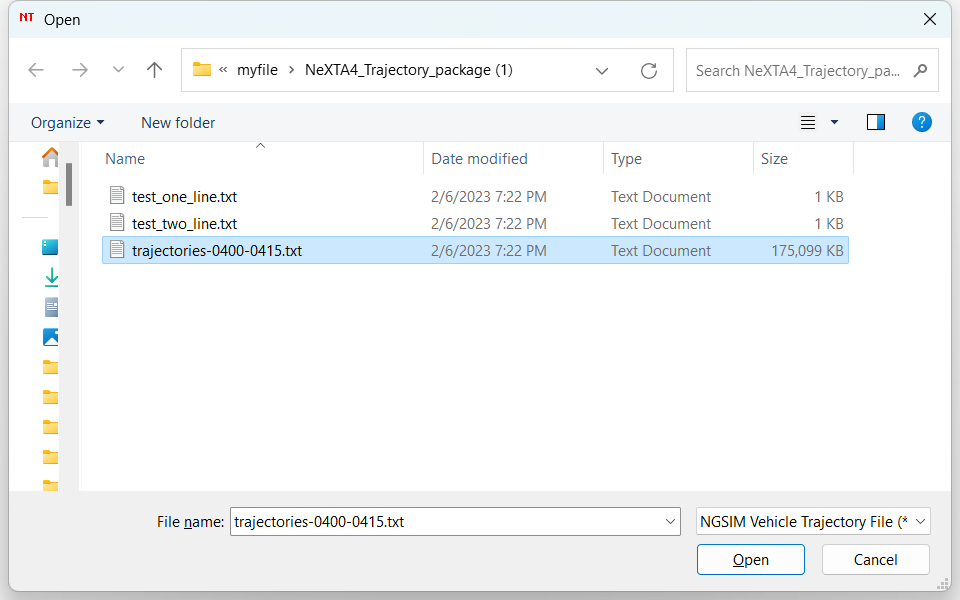
Double-click the NEXTA\_4\_Trajectory.exe executable.



## Load trajectory file

Select menu ‘Tools’ → ‘NGSIM Tools’ → ‘Active Space-Time View’, and then load trajectory file in txt format.





Once the file is loaded, the vehicle trajectories will be displayed in the current active window as shown below. 文本

描述已自动生成

## Display trajectories for each lane.

Users can choose a lane number to visualize the trajectory using the menu ‘Tools’ → ‘NGSIM Tools’.

For example, the vehicle trajectories of lane 1:

散点图

描述已自动生成

The vehicle trajectories of lane 7:

图片包含 散点图

描述已自动生成

## Show Vehicle ID

Users can show the vehicle ID in the menu ‘Tools’ → ‘NGSIM Tools’ and use mouse wheeler to zoom in and zoom out the display for the certain area of the space-time diagram.

图片包含 图形用户界面

描述已自动生成

## 3. Advanced Functions

## 3.1 Calculate the flow by clicking-and-drawing a line in the space-time plane

With the mouse, users can draw a line in the space-time plane, and NeXTA will automatically calculate the flow, density, and speed of vehicles that travel along the line.

图形用户界面, 图表, 应用程序

描述已自动生成

## 3.2 Show cumulative flow count and density

Users can show cumulative flow count and density using the menu ‘Tools’ → ‘NGSIM Tools’.

图片包含 应用程序

描述已自动生成

## 3.3 Show the space-time density contour

Users can show cumulative flow count and density using the menu ‘Tools’ → ‘NGSIM Tools’.

图形用户界面, 应用程序, 表格, Excel

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## 3.4 Show CDF/PDF plot

Users can show the CDF/PDF plot using the menu ‘Tools’ → ‘NGSIM Tools’.

图形用户界面

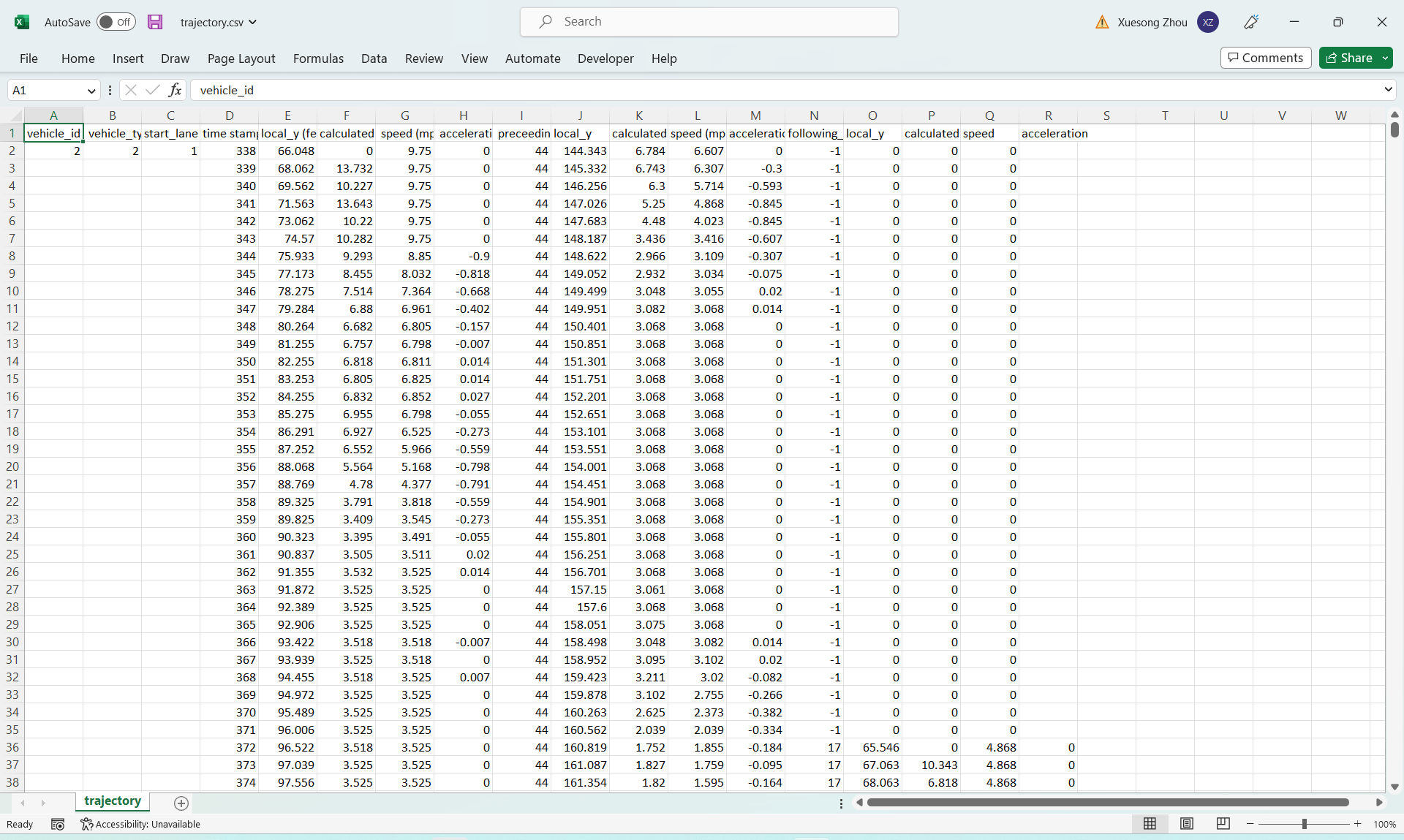
低可信度描述已自动生成

## 3.5 Export the data to text files for analysis of individual vehicles.

Users can show the CDF/PDF plot using the menu ‘Tools’ → ‘NGSIM Tools’->Export Data to Text File.

Graphical user interface, text, application

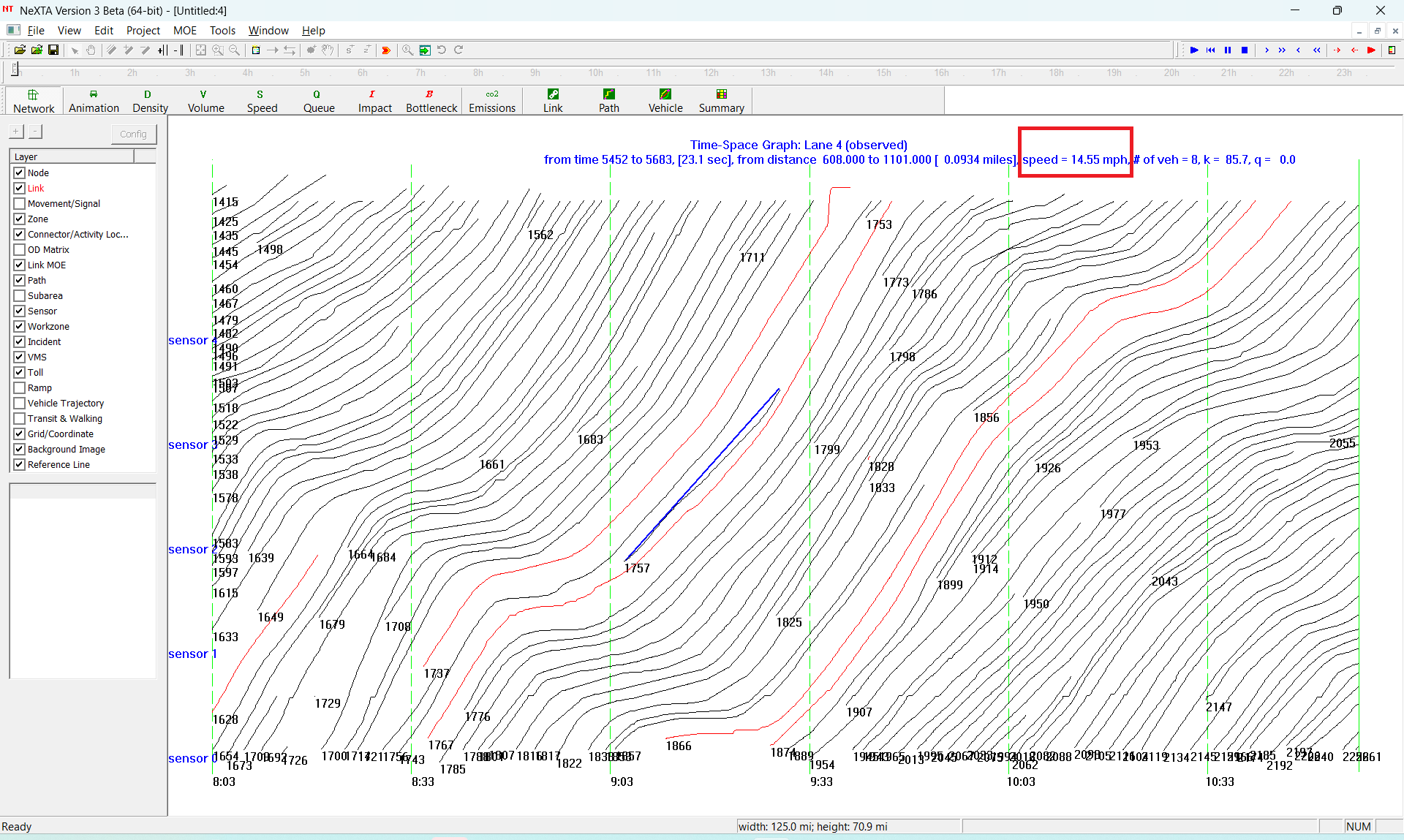
Description automatically generated

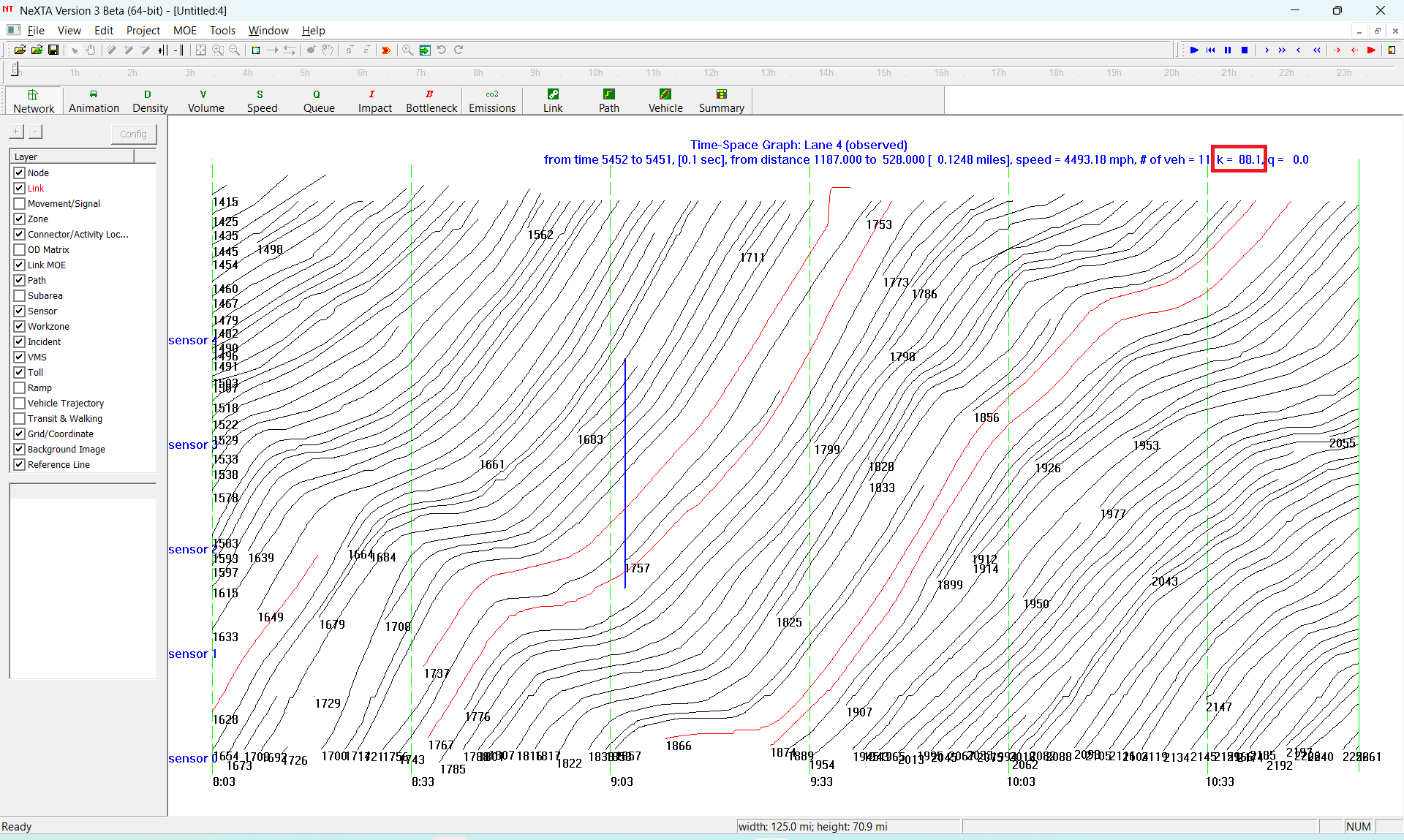


**4. Homework questions:**

1) Find Vehicle id 1757 on lane 4, find the vehicle ids before and after this vehicle.

2) Use the mouse to draw a line to find the speed for vehicle 1757

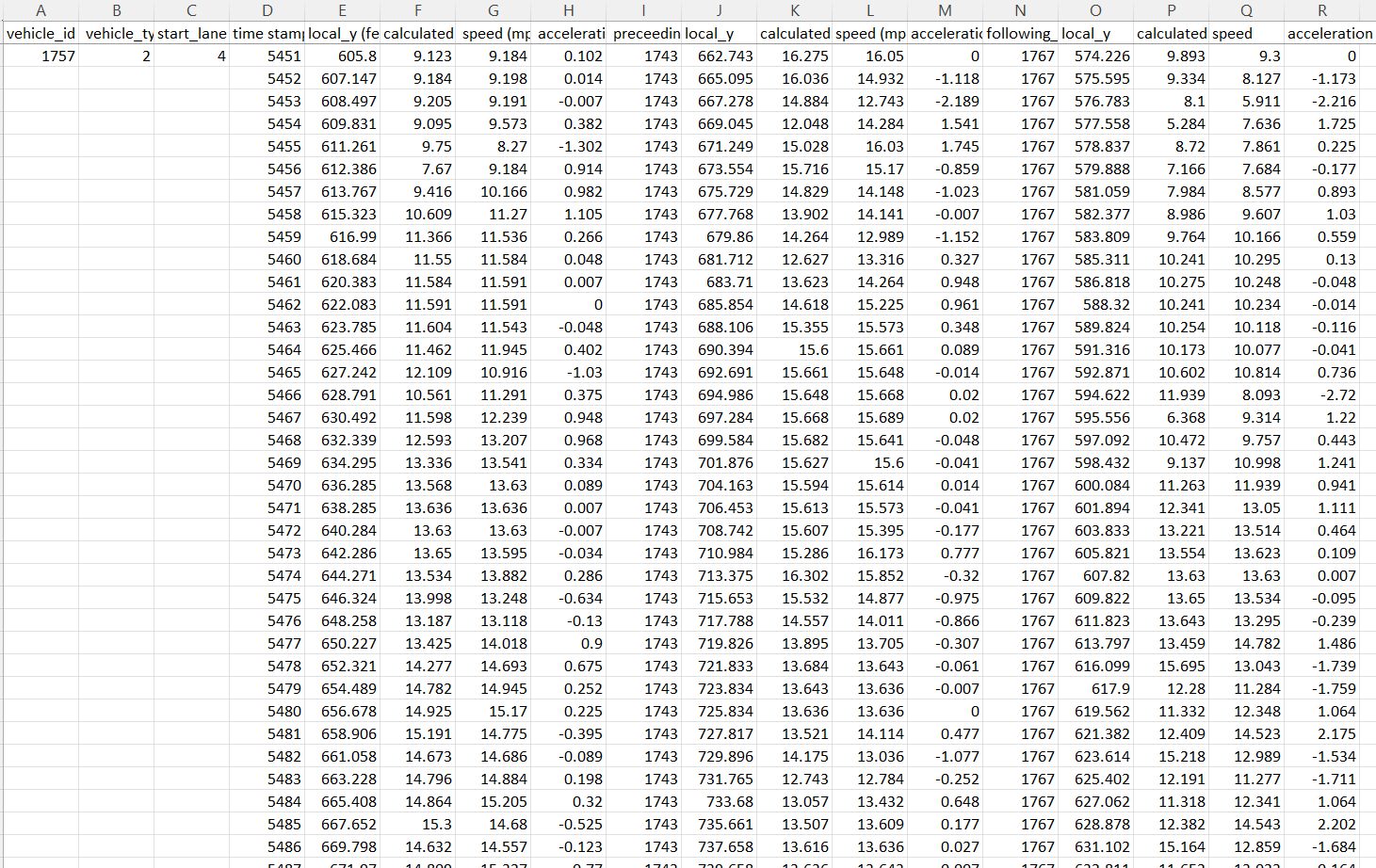


3) Use the mouse to draw a line to find density at timestamps 9:00, 8:30 and 9:30. 

4) Use the mouse to draw a line to find Kjam and backwave speed.

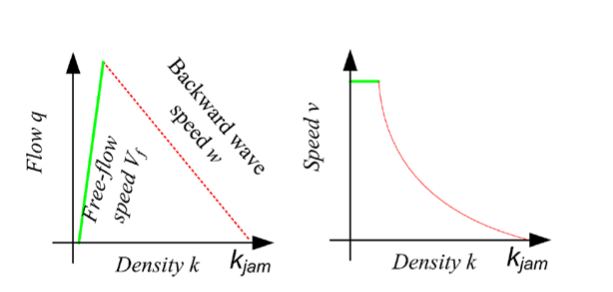


5) Export the vehicle trajectory to a text file, compute the average speed and and maximum acceleration for vehicle 1757 and 1767.



References:

[Full article: DTALite: A queue-based mesoscopic traffic simulator for fast model evaluation and calibration (tandfonline.com)](https://www.tandfonline.com/doi/full/10.1080/23311916.2014.961345)



Diagram

Description automatically generated

Illustration of forward and backward wave representation in Newell’s simplified KW model.