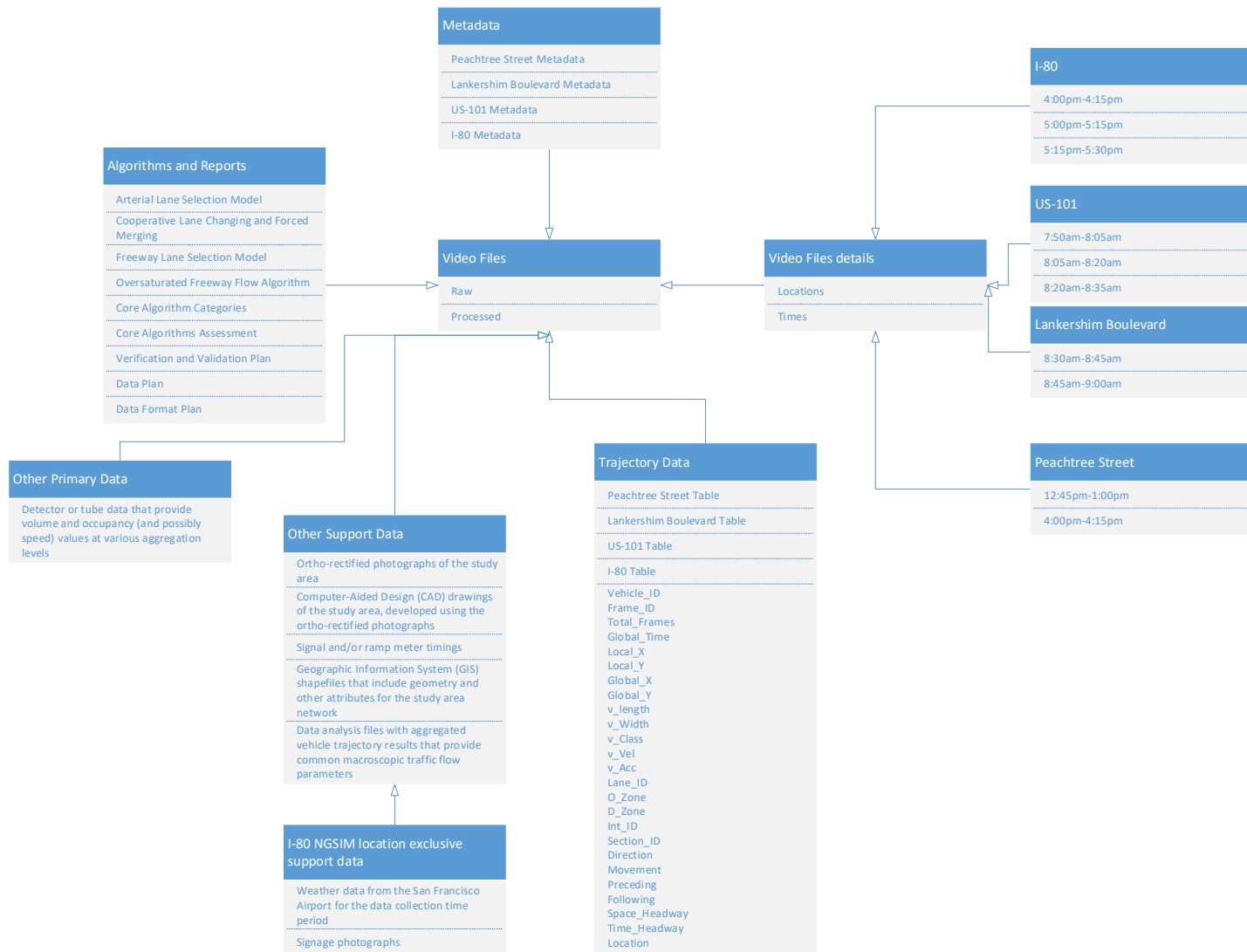


Task 1 Documentation



Here we have my dimensional model.

In the very centre of this dimensional model is the video files both in which both raw and processed versions are available for all four locations which each cover different stretches of time. The processed versions have the vehicles numbered and labeled. Each period is 15 minutes long:

- I-80 covers 4:00pm-4:15pm, 5:00pm-5:15pm and 5:15pm-5:30pm
- US-101 covers 7:50am-8:05am, 8:05am-8:20am and 8:20am-8:35am
- Lankershim Boulevard covers 8:30am-8:45am and 8:45am-9:00am
- Peachtree Street covers 12:45pm-1:00pm and 4:00pm-4:15pm

There is metadata for all four locations which covers what is contained in each zip file for each location that you can download.

The data are contained in eight data sets on the RDE (Research Data Exchange), as follows:

1. Aerial Ortho photos (2 files in TFW and TIF format)
2. CAD diagrams (4 files in various formats)
3. Detector data (36 files in both CSV and TXT format)
4. GIS files (16 files in various formats)
5. Signal Timing (10 files in TXT format, 10 files in JPG format, 10 files in PDF format)
6. Vehicle trajectory data (2 files in both CSV and TXT format)
7. Processed video (1 file in AVI format)
8. Data analysis reports (2 files in PDF format)

Trajectory data is contained within a table with 25 columns and over 11.8 million rows of trajectory data for the four NGSIM data collection locations. Each location also has its own table if only one location needs to be looked at.

A table containing the column name, description of the variable and its variable type is shown below:

Column Name	Description	Type
Vehicle_ID	Vehicle identification number (ascending by time of entry into section). REPEATS ARE NOT ASSOCIATED.	Number
Frame_ID	Frame Identification number (ascending by start time).	Number
Total_Frames	Total number of frames in which the vehicle appears in this data set.	Number
Global_Time	Elapsed time in milliseconds since Jan 1, 1970.	Number
Local_X	Lateral (X) coordinate of the front center of the vehicle in feet with respect to the left-most edge of the section in the direction of travel.	Number

Column Name	Description	Type
Local_Y	Longitudinal (Y) coordinate of the front center of the vehicle in feet with respect to the entry edge of the section in the direction of travel.	Number
Global_X	X Coordinate of the front center of the vehicle in feet based on CA State Plane III in NAD83. Attribute Domain Val.	Number
Global_Y	Y Coordinate of the front center of the vehicle in feet based on CA State Plane III in NAD83.	Number
v_length	Length of vehicle in feet.	Number
v_Width	Width of vehicle in feet.	Number
v_Class	Vehicle type: 1 - motorcycle, 2 - auto, 3 - truck.	Number
v_Vel	Instantaneous velocity of vehicle in feet/second.	Number
v_Acc	Instantaneous acceleration of vehicle in feet/second square.	Number
Lane_ID	Current lane position of vehicle. Lane 1 is farthest left lane; lane 5 is farthest right lane. Lane 6 is the auxiliary lane between Ventura Boulevard on-ramp and the Cahuenga Boulevard off-ramp. Lane 7 is the on-ramp at Ventura Boulevard, and Lane 8 is the off-ramp at Cahuenga Boulevard.	Number
O_Zone	Origin zones of the vehicles, i.e., the place where the vehicles enter the tracking system. There are 11 origins in the study area, numbered from 101 through 111. Please refer to the data analysis report for more detailed information.	Plain Text

Column Name	Description	Type
D_Zone	Destination zones of the vehicles, i.e., the place where the vehicles exit the tracking system. There are 10 destinations in the study area, numbered from 201 through 211. Origin 102 is a one-way off-ramp; hence there is no associated destination number 202. Please refer to the data analysis report for more detailed information.	Plain Text
Int_ID	Intersection in which the vehicle is traveling. Intersections are numbered from 1 to 4, with intersection 1 at the southernmost, and intersection 4 at the northernmost section of the study area. Value of "0" means that the vehicle was not in the immediate vicinity of an intersection and that the vehicle instead identifies with a section of Lankershim Boulevard (Section_ID below). Please refer to the data analysis report for more detailed information.	Plain Text
Section_ID	Section in which the vehicle is traveling. Lankershim Blvd is divided into five sections (south of intersection 1; between intersections 1 and 2, 2 and 3, 3 and 4; and north of intersection 4). Value of "0" means that the vehicle does not identify with a section of Lankershim Boulevard and that the vehicle was in the immediate vicinity of an intersection (Int_ID above). Please refer to the data analysis report for more detailed information.	Plain Text
Direction	Moving direction of the vehicle. 1 - east-bound (EB), 2 - north-bound (NB), 3 - west-bound (WB), 4 - south-bound (SB).	Plain Text
Movement	Movement of the vehicle. 1 - through (TH), 2 - left-turn (LT), 3 - right-turn (RT).	Plain Text
Preceding	Vehicle ID of the lead vehicle in the same lane. A value of '0' represents no preceding vehicle - occurs at the end of the study section and off-	Number

Column Name	Description	Type
	ramp since only complete trajectories were recorded by this data collection effort (vehicles already in the section at the start of the study period were not recorded).	
Following	Vehicle ID of the vehicle following the subject vehicle in the same lane. A value of '0' represents no following vehicle - occurs at the beginning of the study section and onramp since only complete trajectories were recorded by this data collection effort (vehicle that did not traverse the downstream boundaries of the section by the end of the study period were not recorded).	Number
Space_Headway	Space Headway in feet. Spacing provides the distance between the front-center of a vehicle to the front-center of the preceding vehicle.	Number
Time_Headway	Time Headway in seconds. Time Headway provides the time to travel from the front-center of a vehicle (at the speed of the vehicle) to the front-center of the preceding vehicle.	Number
Location	Name of street or freeway.	Plain Text

Within the dataset there is a folder titled “Algorithms and Reports” which contains:

- Arterial Lane Selection Model
- Cooperative Lane Changing and Forced Merging
- Freeway Lane Selection Model
- Oversaturated Freeway Flow Algorithm
- Core Algorithm Categories
- Core Algorithms Assessment
- Verification and Validation Plan
- Data Plan
- Data Format Plan

As covered in the metadata there is other primary and support data. The other primary data is Detector or tube data that provide volume and occupancy (and possibly speed) values at various aggregation levels.

For support data there is:

- Ortho-rectified photographs of the study area
- Computer-Aided Design (CAD) drawings of the study area, developed using the ortho-rectified photographs
- Signal and/or ramp meter timings
- Geographic Information System (GIS) shapefiles that include geometry and other attributes for the study area network
- Data analysis files with aggregated vehicle trajectory results that provide common macroscopic traffic flow parameters

The next two are I-80 NGSIM location exclusive.

- Weather data from the San Francisco Airport for the data collection period
- Signage photographs

The steps that I followed in developing my model were:

1. I read over all the documentation discussing data modeling, the open dataset and using the data to manage traffic on highways.
2. I look through everything the dataset had to offer including the trajectory data, primary and support data, videos, metadata and algorithms and reports.
3. I choose dimensional as the best model type for the dataset I was covering.
4. I made the model started with the videos themselves and surrounding it with the other important pieces of data from the set which all related back to the videos both raw and processed.

This data can be used to manage the traffic on a highway many ways. Acceleration and lane-changing dynamics can be estimated as demonstrated in [“Estimating Acceleration and Lane-Changing Dynamics from Next Generation Simulation Trajectory Data”](#) by Christian Thiemann, Martin Treiber, and Arne Kesting. Highway Trajectory Predictions have been made by Florent Altché and Arnaud de La Fortelle. Lane-Changing Behavior can be modeled like it was by Alireza Talebpour, Hani S. Mahmassani and Samer H. Hamdar.

Using the “Cooperative Lane Changing and Forced Merging” report it is easy to learn from this dataset how effective forced merges were as well as how much of a gap is normally between cars and how often lane changes are made. All of this can go toward planning your own highway to have the best number of lanes and where is the best place to have a forced

merging. The “Arterial Lane Selection Model” shows intersection lane-choice estimation results showing how often a vehicle will choose to be in a certain lane and how much of a lag or lead gap is left. The “Freeway Lane Selection Model” has the main purpose of predicting the occurrence of lane changes in the traffic stream. Knowing how often lane changes occur and where helps you plan how your highway will be built. The “Oversaturated Freeway Flow Algorithm” was created to be used in microscopic simulation models. These models can give an idea of what traffic will be like allowing for changes to be made like adding new lanes or off ramps.

Overall, the dataset can give a better understanding of the flow of traffic allowing the right highway traffic management techniques to be used effectively. For example, speed control is a means to help drivers to travel at an appropriate, consistent speed taking account of the prevailing traffic or weather conditions. Persuading drivers to adopt more realistic speeds can have a calming effect and reduce erratic lane changing. This causes smoother traffic flow. The decision of where to place roadside signs and which ones are needed can be assisted by seeing a video example of where some are and how well they are utilised.

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