Mini-Challenge 1 Data: Traffic Patterns of Life through the Preserve

You will be supplied with a .csv file containing data recorded from sensors around the Boonsong Lekagul Nature Preserve. You will also be supplied with a map containing the locations of roadways and sensors throughout the Preserve. Traffic enters and exits the Preserve through official Entrances. There are several Campgrounds where both day-camping and overnight camping are allowed. There are certain roadways restricted to the Preserve Rangers only. The Preserve Rangers are monitoring traffic through various segments of the Preserve, so other sensors are found in various other locations.

Entry gates are positioned at the Preserve entrances. Each vehicle receives an entry ticket at the gate and is assigned a vehicle class; the entry is recorded. The entry ticket contains an RF-tag that enables the Preserve sensors to pick up the passage of a vehicle through the Preserve. Each vehicle surrenders their entry ticket when exiting the Preserve and the exit is recorded.

When vehicles enter the Preserve, they must proceed through a gate and obtain a pass. The gate categorizes vehicles as follows:

1. 2 axle car (or motorcycle)
2. 2 axle truck
3. 3 axle truck
4. 4 axle (and above) truck
5. 2 axle bus
6. 3 axle bus

Vehicles receiving a pass with a “P” appended to their category are park service vehicles that have access to all parts of the Preserve. Currently, the Preserve vehicles are only 2 axle trucks, so they are designated as “2P” vehicle type.

There are five types of sensors recording data.

1. Entrances. All vehicles pass through an Entrance when entering or leaving the Preserve.
2. General-gates. All vehicles may pass through these gates. These sensors provide valuable information for the Preserve Rangers trying to understand the flow of traffic through the Preserve.
3. Gates. These are gates that **prevent** general traffic from passing. Preserve Ranger vehicles have tags that allow them to pass through these gates to inspect or perform work on the roadway beyond.
4. Ranger-stops. These sensors represent working areas for the Rangers, so you will often see a Ranger-stop sensor at the end of a road managed by a Gate. Some Ranger-stops are in other locations however, so these sensors record all traffic passing by.
5. Camping. These sensors record visitors to the Preserve camping areas. Visitors pass by these entering and exiting a campground.

The Preserve Map

The contractors working with the Nature Preserve rangers have provided a map that presents the Preserve in terms of a 200x200 gridded area. The grid is oriented with north at the top of the map. Grid location (0,0) is at the lower left corner of the map (the SW corner). They have superimposed both the roadways and the sensor locations on this grid. The map shows an area 12 miles x 12 miles.

Roadways are indicated by white colored pixels on the map. Each sensor type has its own unique color:

* Entrances (green(76, 255, 0)),
* General-gates (blue(0, 255, 255)),
* Gates (red(255, 0, 0)),
* Ranger-stops (yellow(255, 216, 0)),
* Ranger-base (purple(255, 0, 220)),
* and Camping (orange(255, 106, 0)).

Other information about the dataset:

1. Traffic either passes through the Preserve, stay as day campers, or stay as extended campers.
2. Preserve Rangers stay at the ranger-base toward the southeast of the Preserve when they are not working in the Preserve.
3. The speed limit through the Preserve is 25 mph.
4. The Preserve area does not observe “Daylight Savings Time”.
5. The roadways traveling southward from Entrances 3 and 4 do continue to other roadways outside of the Preserve area, but these are not shown on the map. Vehicle data will not reflect travel beyond the Preserve in this direction.

Data Snippet (.csv format)

Timestamp,car-id,car-type,gate-name

2015-05-01 00:15:13,20151501121513-39,2,entrance4

2015-05-01 00:32:47,20151501121513-39,2,entrance2

2015-05-01 01:12:42,20151201011242-330,5,entrance0

2015-05-01 01:14:22,20151201011242-330,5,general-gate1

2015-05-01 01:17:13,20151201011242-330,5,ranger-stop2

2015-05-01 01:20:36,20151201011242-330,5,ranger-stop0

2015-05-01 01:24:11,20151201011242-330,5,general-gate2

2015-05-01 01:46:16,20151201011242-330,5,entrance2

2015-05-01 01:55:25,20155501015525-264,1,entrance0

2015-05-01 01:56:53,20155501015525-264,1,general-gate1

2015-05-01 01:59:27,20155501015525-264,1,ranger-stop2

2015-05-01 02:02:27,20155501015525-264,1,ranger-stop0

2015-05-01 02:05:39,20155501015525-264,1,general-gate2

Data Fields:

Timestamp: the date and time the sensor reading was taken

Car-id: the assigned car ID from the entry gate

Car-type: Vehicle type as enumerated above. “P” is appended when it is a park vehicle.

Gate-name: name of the sensors taking the reading. See the map.