MIDTERM PROJECT REPORT

Background Senario:

Mistford is a mid-size city is located to the southwest of a large nature preserve, Boonsong Lekagul Nature Preserve. Signs have been discovered that the number of nesting pairs of the Rose-Crested Blue Pipit, a popular local bird due to its attractive plumage and pleasant songs, is Decreasing.

The Boonsong Lekagul Nature Preserve is used by local residents and tourists for day-trips, overnight camping or sometimes just passing through to access main thoroughfares on the opposite sides of the preserve. A hypothesis is proposed that there is a link between traffic and the decline in the nesting Rose-crested Blue Pipit. We need to examine the movement of traffic through the Boonsong Lekagul Nature Preserve. There is some traffic data and a map provided for us. Based on what we mention above, we would like to analyze the problem and consider the solution to solve this and improve the environment. We want to use visual analytics to analyze the available data and develop responses to the questions below (1-4).

The city has a small industrial area with four light-manufacturing endeavors. The harmful gases are also a possible impact factor. There are four manufacturing factories pouring chemicals different south of the Preserve. There are nine sensors, distributed around the factories, and set between the smokestacks, the city and the nature preserve, monitoring the gaseous effluents from the factories. Air sampler data, meteorological data, and locations map are available now. We are going to determine which (if any) of the factories may be contributing to the downfall of the Rose-crested Blue Pipit.

Data Description:

We have 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. The Preserve Rangers are monitoring traffic through various segments of the Preserve, so other sensors are found in various other locations. 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), General-gates (blue), Gates (red), Ranger-stops (yellow), and Camping (orange).

We also have a .csv file containing data recorded from sensors around the Boonsong Lekagul Nature Preserve. Here is a data Snippet:

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

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. Besides, 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 other .csv file called ‘Sensor Data.csv’ consists of sensor readings from a set of air-sampling sensors. The sensors map shows the locations of the sensors and factories by number for the sensors and by name for the factories.