Project Work Statement

Sponsor

The Shanghai Municipal People's Government

The Transportation and Highway Administration

Participants

Jing Huang(Rachel), jhuang63@jhu.edu

Potential Participants

Academic Mentor: Nam Lee, nhlee@jhu.edu

Co-worker: Rong Fan, rfan@jhu.edu

Date: October 17, 2012

Any apparent association of this work to The Shanghai Municipal People's Government is fictional one, and the sole purpose of this work is a class exercise

1 Background

The Shanghai Municipal Peoples Government is focusing on improving the quality of peoples lives. The Transportation and Highway Administration is one of the departments in the government, and is responsible for improving the quality of roads and highways facilities, as well as solving the traffic congests. Nowadays, as a typical modern city that has more than 17 million residents, Shanghai receives more and more attention from society and organizations for its worsening traffic condition. As a newly established department of Shanghai Municipal Peoples Government, the Transportation and Highway Administration gathers rich intellectual resources and aims at developing health Transportation Flow Systems. Relying on the platform of Shanghai Government, coordinating with other government department, the Transportation and Highway Administration has evolved into a successful policy constitutor. Its ability to collect, process and analyze massive amount of transportation data allows citizens to enjoy healthier transportation system and the fruits of modernity.

2 Problem Statement

As we mentioned above, the traffic congest is now an urgent issue to tackle in the city of Shanghai. The policy constitutor puts forwards policy-Traffic Control to deal with traffic congest and wants to know the suitability of this policy. The Government of Beijing has used this kind of policy, so the data from Beijing can be used as the benchmark for this problem. We use average speed and single line traffic as the standard variables to evaluate clearness of the roads. Combined the theoretical models and real-world statistical data, find the function between average speed and single line traffic. For the concern of simplification, we well model for the main roads and highways in main districts. Besides, the difference between daily data and holiday data will be ignored and treated as white noise.

The drawback of the Traffic Control policy lies in finding a sustainable way to deal with traffic congest. The current policy is only a temporary solution to the problem, a long-term solution is needed to deal with the worsening traffic condition.

The sponsor currently has a limited capability to conduct such statistical research and modeling with existing data, and our task is to provide them with a statistical conclusion with reasonable assumptions.

3 Approach

Our study begins with a quantitative and qualitative review of existing Traffic Control data from Beijing and uses it as the base of making prediction in our model. Our major source of information on the mechanism is public data. Based on existing data, we will create a mathematical model for us to identify the current traffic condition and make prediction of traffic condition after the action of policy. We will devise a control strategy using the mathematical model to deal with the traffic congests.
Our control strategy will be modeled by data regression, filtering and back tested using historical data from Beijing. We will divide our model into two parts: the current condition model and the prediction model for action of policy. We plan to use around 5 years' data as current condition model, and the 2008' data of Beijing as the prediction model.

4 Milestones

We have the following major deadlines:

- Work Statement due date, Sep 28, 2012,
- Midterm Presentation due date, Oct 12, 2012,
- Progress Report due date, Oct 26, 2012,
- Final Presentation due date, Nov 6, 2012,
- Final Report due date, Nov 30, 2012.

5 Deliverable

5.1 From Team to Sponsor

The following outputs are expected from this project:

- Prediction of traffic flow after Traffic Control
- Model-based average speed
- Comparison between traffic condition with-policy and traffic condition without-policy

- Matlab package with a complete set of documentations along with some test codes that can be used to reproduce our numerical and simulation test results
- An optimal number of vehicles on the main road
- Long-term solutions that can be used to alleviate the traffic congest
- Technical report and presentations summarizing the work

5.2 From Sponsor to Team

In order for our project to be of successful one, we will need:

- Images for training the numerical algorithms
- Computing resources
- Timely responses to inquiries,
- Symposium attendance travel expenses.