

## AN APPLICATION OF A CELL TRANSMISSION MODEL USING CROWDSOURCED DATA FOR EXPRESSWAY MONITORING

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With the increasing traffic congestion in alternative roads, the demand for expressways is increasing rapidly in Sri Lanka. With this increase in demand, traffic management systems are needed for expressways. Deviating from traditional expensive methods of traffic data collection, a more economical and reliable data collection method is needed for developing countries.

This study aims to develop and apply a Cell Transmission Model which was first introduced by Carlos F. Daganzo in 1993. The crowdsourced traffic data collected by Google Distance Matrix API has been used. An expressway section was selected and divided into number of sections referred as cells, which were defined with different cell lengths according to the location of the expressway section. The average speed of each cell was collected from Google maps using the M-TRADA platform to identify the traffic condition of the selected expressway section, every 5 minutes. The speed data collected were represented in a spatiotemporal graph.

Different cell lengths were tested to identify the optimum cell lengths for the model that would allow to identify variations in speed changes. A manual flow data collection was also collected to study the trend between manually collected flow data and speed data collected from M-TRADA. 2 types of cells were used as 200 m and 250 m as normal cells and 400 m and 500 m as doubled cells. Data were collected for both the types simultaneously. According to the comparison done for both the cell types, the normal cells show sufficient information of speed changes than the doubled cells and the cell size has to be at minimum 200 m at the on/off ramps, near sharp curves and near interchanges, while a cell size of 250 m would be sufficient to for cells within the main lanes.

This model is more useful for expressways with higher demand. A user interface is proposed for a web application that can be developed using this model for real-time traffic monitoring purposes. Because of the simplicity of the model, even non-expert users will be able to use this web application.

**Keywords:** cell transmission model; crowdsourced Data; Google Distance Matrix API; M-TRADA

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