Trainfo at Railway Crossings

Collecting live and historical data of at-grade railway crossing blockages to inform route planning and hazards analysis for truck movements.

CASE STUDY

Freight Challenges	Congestion, Last Mile Access
Data Sources Used	Computer Vision
Analytical Approaches	Identification, Location

Screenshot of TRAINFO Map
Source: Trainfo Online Application:
https://play.google.com/store/apps/details?id=eu.vranckaert.trains.be

WHAT ARE THE FREIGHT CHALLENGES?

At-grade railway crossing blockages usually occur without warning road users in advance. This unpredictability can create temporary traffic congestion, resulting in truck queues at crossings and creating safety hazards for trucks, vehicles, and trains. Public agencies have historically had limited options when facing this challenge. Choosing between high cost congestion relief solutions such as grade separation or low cost geometric modifications is usually based on benefit-cost analysis. Part of these analyses are based on delays associated with crossings. Public agencies normally estimate the impacts of these delays, as limited resources makes measuring the precise amount of delay a challenge for them.

WHAT WAS THE GOAL OF THE PROJECT?

TRAINFO is a new data source that provides live and historical railway crossing blockage information. The company's goal is to help public agencies prioritize investments in traffic congestion relief projects, support timely emergency services, improve safety by reducing risk of collisions, and provide freight agencies with reliable information on railway crossing improvement options.

WHAT DATA SOURCES WERE USED?

TRAINFO uses trackside sensors to detect railway crossing blockages. These sensors can be installed off rail property, are low on cost, and maintenance requirement. The blockage time and duration data are then transmitted to a cloud server through wireless communication.

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Interactive Online Map of Train Crossings

Source:Trainfo Interactive Map of Train crossings. [Online]. Available:

http://trainfo.ca/_pages/admin/demo.php

Contact Information

TRAINFO
contact@MORRconsulting.com
204-453-6321

WHAT ANALYTICAL APPROACHES WERE APPLIED?

TRAINFO uses patented machine-learning algorithms to confirm the status of railway crossings and predict railway blockages for in advance warnings. This information can then be sent to smartphones, roadside Variable Massage Signs (VMS), traffic management centers, emergency dispatchers, and etc.

TRAINFO data can be integrated with traffic volume counts to inform travel time delay cost analysis. A study of at-grade crossings in Winnipeg, Manitoba showed that the travel time delay calculated by TRAINFO application was more than twice the delay estimated by conventional methods which can have significant impacts on the results of cost-benefit analysis.
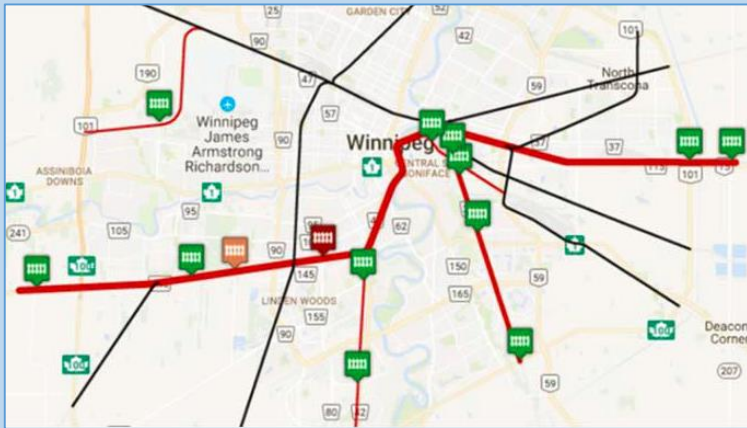
WHAT WERE THE RESULTS?

The real-time and historical data of railway crossings are also available in excel file format to facilitate detailed trend analysis. The following are some examples of statistical analysis that can be produced using TRAINFO data source:

* Analysis of the number of blockages by hour-of-day, day-of-week, and for each month of year;
* Analysis of the average and maximum blockage duration by day-of-week.

Integration of real-time railway blockage information with connected vehicle technology also provides an interesting platform for future developments of TRAINFO application. Integration of TRAINFO with navigation applications can also provide an accessible platform for road users to decrease their travel time and therefore contribute to the reduction of costs associated with congestion and travel time delays.

HOW WERE THE RESULTS VISUALIZED OR COMMUNICATED?

To disseminate the data of railway crossing blockages and their durations, TRAINFO shares information via an application programming interface (API). This information can be viewed in smartphones or used by traffic management centers, VMSs, interactive online maps, and etc.