



## COVID19 TravelSafe Navigation Tool

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### The Urgent Need for a COVID TravelSafe Navigation Planner

During the COVID-19 pandemic, pedestrians are more circumspect when traveling within the Greater Toronto Area. Similar situations are present around the world. Among the existing navigation tools, little has been done to incorporate the risk of exposure to the COVID-19 virus in the route planning phase. As a result, pedestrians need a practical way to reduce their traveling risk. Our client MM is looking for a solution that integrates COVID-19 related data, geographical information systems (GIS), and machine learning techniques to provide an interactive navigation tool for pedestrians and public transit riders to travel safely in the urban environment. The development of such tools can better inform pedestrians about the infection risks of different routes, assist them to make travel decisions, and protect the community. The tool was developed in a modular structure which enables the inputs of different geographical traffic information and hence it can potentially be applied in other cities to prevent any respiratory virus spread in transportation.

### The Innovative Approach Using Computer Vision and Machine Learning Techniques to Reduce Travellers' COVID Infection Risk

This COVID-19 TravelSafe navigation tool is a web-based application that customizes routes based on user preferences on travel time and risk and so, interactively assists decision making in pedestrian and public transit travel. The user can adjust the tradeoff between time and risk, and the particular locations to avoid, and the mode of transportation any time while using the tool. Furthermore, in order to measure COVID-19 risk based on open-source data, the team uses object detection algorithms to crawl real-time pedestrian density data from Toronto's traffic surveillance camera images. The extracted data is then interpolated and evaluated through machine learning solutions. In particular, the A\* search algorithm is leveraged to find a set of fast and sparsely-populated routes for the users. Through iterative user studies and design processes, the tool is developed to provide a user-friendly interface so that minimal knowledge is required to use the app. Besides providing a timely solution in response to the ongoing pandemic situation, the team strived to obtain the best available data possible given the resources available.