



ACTIVITY MODELLING FOR RISK ASSESSMENT AND E.M. APPLICATIONS FOCUSSING ON PERI-URBAN REGIONS

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How reliable is your car?

When you go somewhere in a car do you worry you might be late?

Will there be road works or maybe a crash to delay you, or maybe even involve you?

What if your life depended on being on time?

For anyone evacuating during a bushfire their life does depend on it and the risks are much greater than a normal journey.

My research seeks to answer two questions:

1. How dangerous is late evacuation?
2. Which is the most significant risk factor for late evacuation?
 - Human factors (stress affecting choices and driving ability, physiological affects of smoke)
 - Physical (smoke affecting sight distance; roads blocked by fallen trees, powerlines and vehicle crashes; etc)
 - Network (rural road networks are sparse – there aren't many alternative routes).

Research Approach

I will develop a computer based simulation model of portions of the 2009 Victorian Bushfires with the following elements:

- Activity modeling of people who will occupy dwellings, go to work, shopping, school or maybe tourism. When they evacuate they will move in groups in vehicles across the study area.
 - A detailed formula-based model of how a vehicle might travel along a single road segment affected by an approaching bushfire to model the effects of wind, smoke and fire (using fire and smoke data from FIRE-DST) on whether the road is passable and how difficult it is to drive along. The model would predict how long it takes to travel through the segment or if the vehicle is blocked and returns or crashes.
 - The individual road segments (using road network GIS data from NEXIS) are linked together to simulation of the whole study area.
 - Statistics are recorded on the outcomes for each person so that results can be broken down by useful indicators such as by initial location, gender, age, vehicle availability and route taken.
- Significant questions that need to be answered to build the simulation include:
- Where do people evacuate to? What exactly is a place of safety?
 - Do people change the way they go (route choice) when evacuating?
 - Is congestion of roads a significant factor in late evacuation?
 - How much does smoke affect the relationship between vehicle speed and crash risk?

How this research will help

By quantifying the risks of late evacuation, the risks of evacuating early and staying can be compared. This value will vary by location and would be useful for both individuals and policymakers. The second question will guide further research which can be used to reduce the risk of late evacuation.

By producing a transport simulation for bushfires new and novel approaches to managing evacuation can be tested such as:

- Designated routes for evacuation backed by tow-trucks to clear crashes
- The value of making some roads one-way during a bushfire
- Which road segments are vulnerable to fire moving in a certain direction

•What would you like to test? Write it below:

Future work

This research could guide strategies to reduce the risk of late evacuation as part of the management of bushfires. The combination of high crash rates within a transport simulation could also be used to examine evacuation of denser urban areas.

About Me




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