Predicting and Visualising Congestion to Enable Fluid Tourism Travel

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1. THE PROBLEM
Tourism related travel congestion is a recognized problem in both urban and rural contexts, on routes to destinations, within destinations areas and around tourist attractions. Congestion impacts not only tourists and other road users but also on local people's quality of life while increasing greenhouse gas emissions through slow moving traffic. Congestion is detrimental to the tourist experience with evidence suggesting reduced visitation to some attractions and destinations with obvious economic implications for tourism providers. Often the problem is relatively spatially and temporally localized and, to a large extent, predictable based on season, day of the week, attraction opening hours and weather conditions. Local people and, to some extent, repeat visitors build up tacit knowledge of congestion and can modify their travel plans according to anticipated local road conditions. By definition, tourists are visiting a place away from home and therefore lack the local knowledge to re-structure their travel plans. This group is therefore particularly vulnerable to traffic congestion.

From a tourism perspective there are two related problems:

1. Enabling tourists to understand how congestion might impact the time taken for a trip relative to the time they set off (i.e. there might be a better time to go).

2. Enabling tourists to understand which trips might be feasible from their current location given anticipated local traffic conditions and the time they have available (i.e. if a visitor has 2 hours available, where can they go?)

An additional problem is tourists using 'rat runs' that is seeking out unsuitable alternative routes using minor roads, which is often an outcome of traffic congestion.

2. THE IDEAL SYSTEM
Our vision is for a system that embeds the following features:

- Utilisation of current (real-time) and historic traffic feeds in order to make predictions about congestion in the immediate future time horizon (i.e. next 0-24 hours). Traffic feeds might include data from speed cameras, transport authority recording devices, user generated feeds from smartphones and any other traffic volume data.

- Ability to relate weather data to traffic volume in order to make predictions about likely road congestion conditions.

- Ability to consider other factors that have a temporal impact on traffic volumes such as local events (e.g. a music festival) or visitor attraction opening hours.

- Appropriate visualisation of predictions to tourists using mobile media.

An existing system showing some promise has been developed to reveal Moscow traffic congestion to smartphone users. Rather than making predictions, the Moscow traffic system is based on real-time information from users. This system reports the smartphone speed of movement and presents data in the form of congestion maps back to users. Our idea is to extend from a real-time system to one that is able to predict congestion since tourists have more scope than commuters to modify the trip time and destination.

3. POTENTIAL CASE STUDY VISION
Tourism contexts are diverse. Car-based tourism is a particular feature of rural tourism, with cars used for up to 90% of trips in some contexts (for example, National Parks). While congestion problems pervade urban areas, tourists often visit urban destinations without cars. Therefore UK rural tourism provides an interesting context. Areas with particular problems include National Parks and coastal areas with tourism related congestion peaking late morning and late afternoon. In rural contexts the problem is exacerbated by small roads and often restricted parking opportunities.

A particular case is the Isle of Purbeck region in Dorset. Purbeck incorporates the Jurassic Coast World Heritage site, including iconic destinations like Lulworth Cove, Durdle Door and Studland beach (one of the top UK beaches). The largest tourism destination town in the area is Swanage. The area is a peninsula...
which, to a large extent, limits access to one A road and a chain ferry from the Bournemouth/Poole conurbation. Traffic congestion is a pervasive feature of the area during summer months with patterns dependent to some degree on weather conditions. For instance, hot days draw visitors to the beach while wet days drive tourists staying in the area to urban centres.

4. THE CO-RESEARCH OPPORTUNITIES AND POSSIBLE FUNDING STREAMS
The co-research opportunities span county level traffic planning and management; tourism destination management and tourist experience research; data mining and prediction based on traffic feeds and crowd sourcing; mobile media user interface and visualisation.

There is presently little funding available from tourism agencies due to government funding cuts. However, given that transport, including congestion and carbon emissions, remains a core UK government concern at a national and local level, potential project ideas are likely to attract national and local government funds. Tourism related congestion is also a significant issue in other EU countries, for example France and Italy, giving scope for an EU project. Finally, the problem sits within several Research Councils UK (RCUK) cross-council themes: digital economy, energy, and living with environmental change (LWEC).