Methods for the validation of model-based flows allocated to the road network: a case study of cycling

Introduction (literature)

* Motivations
* ‘Prove it’ – if a model can predict current or past scenarios then it’s more likely to be trusted for future scenarios (Anderson and Woessner 1992)
* Test if the model is correct (Sagent,2005)
* “substantiation that a computerized model within its domain of applicability possesses a satisfactory range of accuracy consistent with the intended application of the model” (Schlesinger et al. 1979)
* To validate a model which predicts future growth in cycling in order to be used from a planning perspective
* How models are increasingly able to allocate to the road network
* Software (e.g. ArcMap Network Analyst)
* APIs (e.g. Graphhopper, OSRM, Routino)
* Methods of validation

Method

* Screen count data (e.g. LCC/Bristol)
* Accident data
* GPS data

Results

* Screen count data (e.g. LCC/Bristol)
* Accident data
* GPS data
* Pros and cons of each (table)

Discussion/conclusions

* Overall finding
* Limitations
* Which to use when?
* Opportunities for further work

# Methods for the validation of model-based flows allocated to the road network: a case study of cycling

## Introduction

Models help transport planners to have an insight in the current patterns of transportation flows as well as visualising any developments due to future scenarios (Schlesinger et al. 1979). Models need to be verified and validated in order to test their reliability; this is often done by testing the model to a known scenario e.g. the current scenario or a past scenario (Anderson and Woessner, 1992).

This paper will use several novel datasets to verify and validate a tool that has been built to predict the number of commuter cyclists on a network. The use of such a model is greatly needed in the UK where there are now 600 million more miles ridden per year between when comparing 1993 to 2014 (Hollingworth *et al.*, 2015) . This increase in cycling has also caused an increase in people being killed or seriously injured, in 2012 there were 3340 people killed or seriously injured when riding a bicycle compared to 2528 people in 2002, an increase of 32% (Keep, 2013) (Hollingworth *et al.*, 2015). Schemes such as city connect in the West Yorkshire region are designed to help encourage more people choose cycling as an everyday mode of transport. However there is little research into whether or not this money has been spent wisely, therefore the main aim of this tool is to help to identify areas where infrastructure spending will have the most impact.

## Literature Review

At the time of writing there are many models and studies which look into where people are cycling frequently and how cyclists choose a route (Broach *et al.*, 2012; Ehrgott *et al.*, 2012; Bierlaire *et al.*, 2013). Few studies try to predict where and how many people will likely to cycle in the future under a range of different scenarios (Porter *et al.*, 1999).

There are some novel approaches in the literature which study where the most affective spending would be on the route network (Larsen *et al.*, 2013). Simple studies suggest improving roads which already receive high levels of cyclists at certain times of the day. More complex approaches see the current network as inferior and take a more holistic approach by trying to create a more joined up system where cyclists can move more freely rather than being stuck on the most popular routes which may not facilitate their needs. Amongst the literature there is certainly a very strong opinion that if an area receives more improved cycling infrastructure then the amount of people using the facilities will increase. There is an argument as to what type of infrastructure is required to achieve the best possible outcome, many papers insist that off-road infrastructure is the way to go, others believe that painted bike lanes are good enough (Dill and Carr, 2003; Krizek *et al.*, 2007; Parkin *et al.*, 2007). highlighted how infrastructure can change with demography and experience, In research that Broach *et al.* (2012) they discovered that demography and experience changes people’s perception of safety, several studies suggest that women and the elderly feel less comfortable than men and younger generations while the more experienced a person is at cycling the less infrastructure to feel safe they require.

## Methods

### Screen line data

Measuring daily flows of traffic is usually carried out using the screenline method (Nicolaisen and Driscoll, 2014). Screenline counts are usually carried out manually via pen and paper records, therefore opening them up to human error when recording data. Recently there has been an advance in computing that allows the recognition of shapes; this technology is now being used to record the number of cyclists passing a point. The added advantage of this automation is that data can be collected for every hour of everyday, whereas previously manual data collection could only be carried for as long as the user was willing to pay to record data. Therefore collecting data manually would lead to a sub-optimal dataset.

In this paper the screenline data was collected over the period of



Figure Screen lines for Leeds - each line is placed over a commuter corridor in order to capture the total flow of cyclists moving in or out of the city centre

### CCTV data



### Accident data

### GPS data

* Screen line data
* Camera data
* Accident data
* GPS data

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