Validating a Predictive Mathematical Modelling Paradigm for Travelling From Point A to Point B

Garth, Edward (School: Redeemer Baptist School)

Estimating the quickest path from A to B is the aim of mapping software such as Google Maps which calculate route times using parameters such as road size, real-time traffic density and historical data. Inconsistencies in timings occur as their collected data does not necessarily compensate for node (intersection) dynamics. Formulating a route by weighting the nodes increases the reliability and accuracy of timings as nodes account for approximately 40% of trip time. To validate the accuracy of the author's mathematical modelling algorithm from his previous 2020 study, a double-blind experiment was conducted involving 17 drivers, covering 10 routes completed 5 times each. Each independently selected route involved travelling from point A to B and B to A both clockwise and anticlockwise 10 times. Data analysis of these 2040 trips found the clockwise routes to be quicker (94%), less variated (72%) and safer (33%). Compiled route data showed clockwise was faster in all 10 routes, for which 8 were statistically highly significantly faster ($P < 0.001$). For all 10 routes, Google Maps selected the anticlockwise route as its preferred choice, so these results go directly against the underlying assumption or paradigm that the latest technological mapping software is always correct. This study concludes that when given two route options travelling from point A to B during peak traffic times, the clockwise route is the quicker, less variated and safer option even when the anticlockwise route is favored by mapping software. These findings are reversed for countries with right hand drive.

Awards Won:
American Mathematical Society: Third Award of $500
Fourth Award of $500