THE OFFICE OF
THE SCOTTISH ROAD WORKS COMMISSIONER

Algebra Geometry & Quantum Fields

AGQ CDT PhD Students Placements Programme with the Scottish Road Works Commissioner (SRWC)

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The SRWC hosted two AGQ CDT PhD student placements over June to August 2026 to work on a challenge. Placements are a mandatory part of the AGQ CDT programme, giving doctoral research students opportunities to engage with real world challenges and to help them develop transferable skills in order to support their post PhD transition and their future career choices.

The purpose of the project was to investigate the conflict checking and impact scale of roadworks on the Scottish Roadworks Register focusing on two questions:

- Is there a predictive relationship between traffic conditions and roadworks that could serves as a measure of roadworks impact?
- Is there a quantitative way of capturing traffic sensitivity in order to identify works that are most likely to cause significant disruption?

Supervised and unsupervised machine learning approaches were used to investigate the relationship between available traffic data and roadworks. Our experiments suggest that a roadwork happening by itself does not lead to traffic patterns that are significantly different enough from traffic patterns without roadworks for a machine learning model to distinguish them. The conclusion is that a machine learning approach using the currently available traffic data is not the most fruitful way forward.

A graph-based approach to traffic sensitivity was prototyped on the road network in Glasgow. Traffic assignment is based on origin-destination demand and network properties. Then, roads are removed from the network and travel time across the network is recomputed, leading to a notion of criticality of road. The results for Glasgow are promising despite limitations due to data quality.

Building on the traffic criticality analysis with a careful analysis of road capacities, lane numbers, and better quality origin-destination data is a promising way forward. Combining the outputs of the model with expert local knowledge could provide a scale for the current notion of traffic sensitivity. A disruption index could be developed based on the model or it could be used to filter and streamline conflict checking on the register. Moreover the model could be integrated into conflict checking by looking for combinations of roads that when affected simultaneously increase the travel time of the network significantly.

Further suggestions:

- From discussions with local authorities a number of simple, practical measures are suggested that could be implemented on the Scottish roadworks register to improve user experience.
- If the register could track how conflicts are currently handled thereby creating a data set of roadworks conflicts alongside with resolutions, this could train a model to learn which combinations of roadworks are problematic and how they are resolved.
- With further bus delay data it might be possible to establish a relationship between roadworks and bus delays which would be another way of quantifying the impact of works.

We would like to thank the SRWC team and the stakeholders and users of the Scottish Roadworks Register for their help and support during the placement period.