

# Making road networks that lower risk of traffic accidents

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## Abstract

In this thesis we compare different algorithms for constructing a road network from a set of points. The aim is to minimize the risk of traffic accidents by spreading out traffic across the network. We focus on the structure of the road network, rather than traffic signs and sight-lines. This is done with a simulation study using a simplified model where the road network is represented by a euclidean graph, and each point has a population of cars traveling to the other points. The risk of a point is the square of the number of cars traveling through it, and the aim is to lower the total risk per capita with efficient use of road space.

A set of algorithms are tested that work off a base of the minimal spanning tree of a Delaunay triangulation, iteratively adding back edges from the triangulation based on some criteria. The notable front-runners are the algorithms many paths and crowded, which prioritize adding back edges between points with many routes through it, and edges between high population points, respectively. We also find that the algorithms that add back edges with high or low difference in population between the connected points perform no better than each other, suggesting that the difference in population between connected areas is an unimportant factor when designing a road network.

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