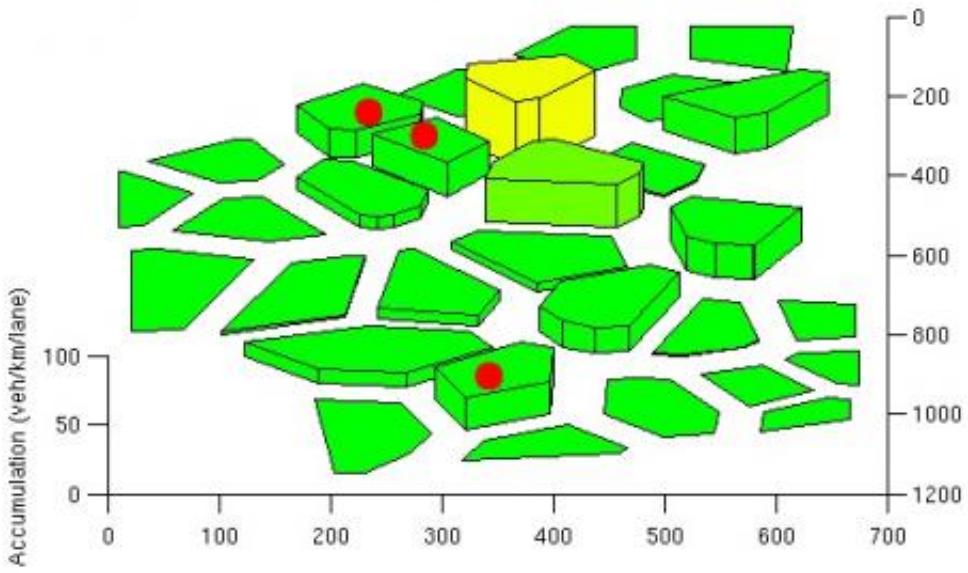
New regional traffic model to combat urban road congestion

January 9 2014, by Roy Meijer



Tegenhouden aan randen/*Limit inflow*

Until now, traffic flow models have been based on individual vehicles or roads. The length of time needed for calculating models for larger areas, such as complete cities, was too great. However, Dr Victor Knoop, assistant professor of traffic flow at TU Delft, has now devised a new traffic model that is capable of calculating the traffic situation for large urban areas. He will be presenting the model on 12 January 2014 in

Washington, at the Annual Meeting of the Transportation Research Board, the most important annual scientific conference on traffic.

From the motorway into the city

Urban traffic management is becoming more and more important now that traffic queues on motorways are diminishing in the wake of road-widening schemes. Traffic queues in cities are still very much with us and are getting worse, in relative terms. Teleworking, congestion charges and other measures such as limiting access to cities on the basis of a vehicle's registration number are resulting in fewer people being in their cars at the same time.

But according to Knoop, progress can still be made in urban areas even with the same number of cars on the road.

Urban district as the basic element

There is a direct relationship between the number of cars in a certain area and the average local speed – this has been known for a long time. Knoop used this fact to devise a new traffic model. The model uses the districts of a large urban area as the basic element. This means that the number of elements is much smaller, and the model much quicker. Knoop: "It gives us a tool that enables us to calculate the best way of accessing a busy urban centre."

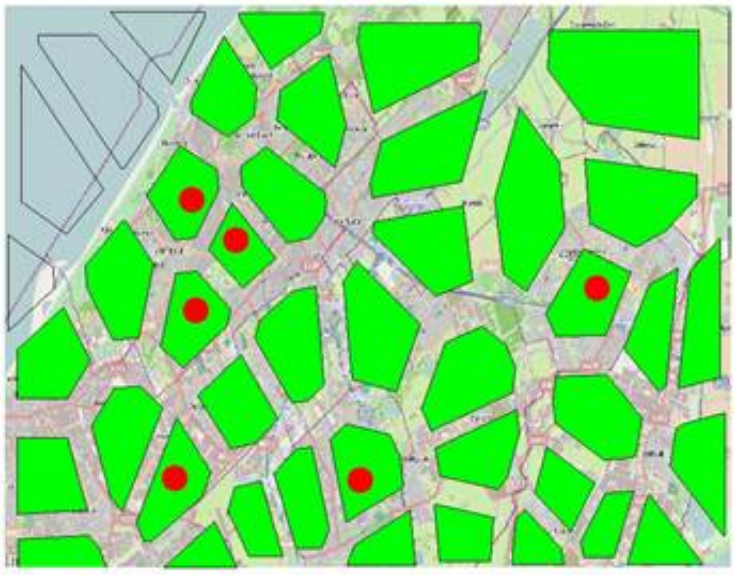


Illustration: diagrammatic representation of region of The Hague.

Gaining time by waiting

Knoop's traffic model calculates how the flow from one area to another has to be regulated by maintaining flows in every area at an optimum level, for example by allowing traffic lights to 'talk' to each other.

With fewer people in an area, the traffic flows more easily, as that prevents the formation of gridlocks. There are two ways of keeping people out of a particular area – by stopping them, or by letting them take an alternative route around it. Both methods cost road-users time, but whether or not this is ultimately useful depends on many different factors. However, these can at least now be calculated. It may sound strange, but by waiting, it is possible for journey times to be shortened. Knoop: "It is possible, perhaps, that you have to wait outside the city for five minutes, as a result of which you eventually arrive at your destination ten minutes earlier."

Expansion

The model currently only works with cars, but Knoop and his colleagues hope to be able to integrate pedestrians and cyclists into it in the future. He is also hoping to expand the tool in order to calculate emissions. After all, the air quality in cities can be significantly improved if car users have to wait outside cities before being allowed in. An expanded version of the model would show not only the change in journey times, but also the effects on fine particles and CO2 emissions.

More information: For more information, see victorknoop.eu/research/networktransmissionmodel/

Provided by Delft University of Technology

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