

Capturing local knowledge

Background: the shortest route is not always the best

Human beings excel at common sense. When they've lived somewhere for a few months they will start to intuitively grasp the area. They won't go near the high school at 8:15 in the morning. They avoid the town square on market day. They know that on Friday afternoons, heavy traffic starts early. They are familiar with the speed bumps in their neighbourhood, and stretches of evilly-programmed traffic lights.

But is it necessary to know the location and frequency of the traffic lights? Does it matter whether a delay is caused by a traffic light or a roundabout? Does it matter *why* a detour takes nine minutes on average? The answer is a resounding NO! The only thing you need to know is that it *does* take nine minutes on average. And this is incredibly useful information over a long period of time and many miles.

TomTom taking the lead

Figure 1 shows three ways of going from A to B. Driving 50 km/h, it will take 4 minutes to go straight, 5 minutes to take the short detour, and 6 minutes to take the long detour. So an ordinary navigation device would send you straight across the roundabout.

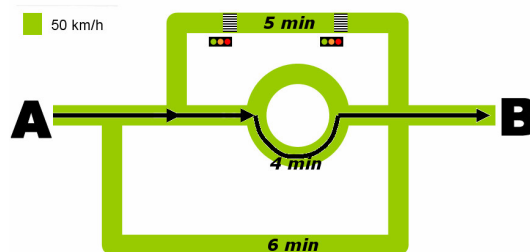


Figure 1: predicted time to travel from A to B

Of course, the map is not the territory. If we were to put in the effort to actually *measure* the speed of a few thousand cars driving these routes, we might discover what is shown in Figure 2:

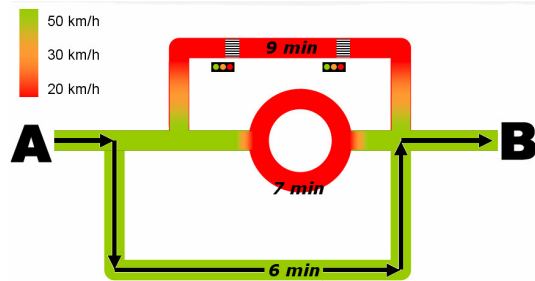


Figure 2: measured average time to travel from A to B

Apparently, the average speed drops to 20 km/h in many places, such as on the roundabout. As a result, it actually takes seven minutes to go straight on. As for the short detour, you *may* be able to do it in five minutes - if you're lucky - but it can take much longer if the traffic lights are against you, and driving it many times shows that *on average* it takes nine minutes! If you knew all this beforehand, you would take the long detour, because *on average* it is the fastest way to get from A to B.

This example clearly shows that having local knowledge is a big deal if you want to plan the fastest route.

A TomTom device calculates the fastest route by determining *all* possible routes and then picking the route that takes the least time. How does a device calculate how much time a route takes? By adding up the times it takes to travel each piece of road. How long does it take to travel a particular piece of the road? Well, calculating *that* is very hard because it can depend on many things. But if you simply measure a thousand cars driving over that piece of road, you will have a very good idea how long the next car is going to take!

To get really good data, you need to measure the average speed not just for every road, but for every moment of the day, and on every day of the week. Unfortunately there are 80,000,000 pieces of road in Europe and the US and map providers would have a hard time capturing such data.

Fortunately TomTom has something map providers do not have: end users - more than any other navigation company in the world. A few years back, TomTom started asking its customers if they would allow anonymous speed statistics to be gathered. Many customers said "Yes". At time of writing TomTom receives over half a billion speed measurements *per*

day. The total database reflects over 14 billion kilometres of actual driving, which means the speed on any street, road or alley in Europe or the US was on average measured over 1,000 times. This is not even counting the speed information that TomTom gathers from other sources, such as TomTom WORK, which logs over 250,000 hours of professional international transportation every day.

Analysing and processing this huge amount of data is a complicated job. TomTom research teams in several countries have been investing many man years of work into it.

New solutions

“Routes based on these measurements are much better than we have ever seen before”, says Harold Goddijn, TomTom’s chief executive officer. “They reduce travel time and fuel consumption by five to ten per cent. We did an extensive beta test with a few thousand people, and typical reactions were ‘it finally drives me home the way I would drive home’, ‘it seems to know about that horrible crossing near the milk factory’ and ‘the way it guided me to work gave me confidence I can trust all the other things it tells me’.”

Another thing users said from time to time is ‘the ETA [estimated time of arrival] was downright creepy. It predicted three-hour trips to the minute! Surely that must’ve been luck - next time the traffic lights will be against me’.

Common sense may say that this is a reasonable prediction, but actually it just shows that you can’t always trust common sense. You may be unlucky at one traffic light or two, but on a three-hour trip it is actually very, very hard to beat the law of averages. And as of April, what TomTom gives you *is* the law of averages. TomTom has the best static information in the industry, and therefore the best routes. IQ Routes to be precise, and we think this will change the industry.