Generic and scalable annotation layers for shortest path road networks

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Abstract

Travel time is one of the most important information in transportation. Planning algorithms use it to optimize tours, and navigation systems use it to predict the estimated time of arrival (ETA). ETA can be calculated on a real-time basis, which can help logistics companies to schedule the truck arrivals at the dock.
When we speak about dynamic travel times, we first think of traffic: statistical traffic, real-time traffic, and forecast traffic. But other events as well could modify the travel times, like toll booth and border waiting times, seasonal closures, or temporary driving bans. Apart from these time-dependent restrictions, additional restrictions depending on the vehicle type have to be considered for shortest path calculation.

All this information, coming from multiple providers, must be combined and evaluated during the shortest-path algorithm in order to calculate the travel time more accurately. Considering the big amount of data, obtaining an adequate performance is one of the main challenges of this technique.

We present a model of generic and scalable annotation layers, based on the road network, which extends the standard network information. Then we focus on how the shortest-path algorithm accesses it to finally compute the most accurate travel time.
Finally, we show how this generic approach allows to easily handle more use-cases like multimodal routing or timetables, by dynamically integrating new data sources to the road networks.

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