Public Transit Map-Matching with GraphHopper

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Find most likely sequence through Hidden Markov Model

\[ \Pr(s_0|c_0^0) \]

\[ \Pr(s_0|c_0^1) \]

\[ \Pr(c_0^1 \rightarrow c_1^1) \times \Pr(s_1|c_1^1) \times \Pr(c_1^2 \rightarrow c_2^1) \times \Pr(s_2|c_2^1) \]
Hidden Markov Model - Probabilities

\[ d = \| s_i - c_i^k \| \]

\[ p(s_i | c_i^k) = \frac{1}{\sqrt{2\pi\sigma}} e^{-0.5\left(\frac{d}{\sigma}\right)^2} \]

\[ d_t = \| s_i - s_{i+1} \| - \| c_i^k - c_{i-1}^j \| \text{route} \]

\[ p(c_i^k \rightarrow c_{i+1}^j) = \frac{1}{\beta} e^{-\frac{d_t}{\beta}} \]
That’s basically it
TRMM - Inter Hop Turn Restrictions
TRMM - Inter Hop Turn Restrictions

\[\begin{array}{ccc}
& c_0^0 & \\
& \rightarrow & \\
& \downarrow & \\
& \rightarrow & \\
c_2^0 & \rightarrow & c_1^0 \\
& \rightarrow & \\
& \rightarrow & \\
& \rightarrow & \\
\end{array}\]
Candidates $c_1 = (u_1, e_1), c_2 = (u_2, e_2)$
Evaluation