September 10, 2020

Joint Transportation Research Program

Department of Civil Engineering, Purdue University

Reference point mapping exercise

Modern vehicles are instrumented with GPS sensors that may log onboard as well as transmit latitude, longitude, and elevation information to the cloud. The State of Indiana operates more than 12,000 miles of roadway; facilities are assigned reference posts (mile posts) at 0.1mile increments not only to help drivers navigate the system, but also enable asset tracking, geo-reference traffic operations, public safety records, and maintenance and construction monitoring. With connected and autonomous vehicles and devices now emitting more GPS data than ever at ever-increasing velocities, efficiency is key when geo-referencing the (sometimes imperfect) vehicle data to mileposts.

Create a Java function that initializes an object that takes an input of 26,000+ reference points in Indiana (attached) and store it in a data structure of your choice. Create a member function that takes an input of latitude and longitude, and using the data structure, return the nearest route+direction, milepost, point identifier, and distance from the latitude/longitude input. The function must be performant to 5 Hz.

Due: 48 hours from receive