Destination Port Detection For Vessels: An Analytic Tool For Optimizing Port Authorities Resources

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Abstract : Port authorities have many challenges in congested ports to allocate their resources to provide a safe and secure loading/ unloading procedure for cargo vessels. Selecting a destination port is the decision of a vessel master based on many factors such as weather, wavelength and changes of priorities. Having access to a tool which leverages AIS messages to monitor vessel's movements and accurately predict their next destination port promotes an effective resource allocation process for port authorities. In this research, we propose a method, namely, Reference Route of Trajectory (RRoT) to assist port authorities in predicting inflow and outflow traffic in their local environment by monitoring Automatic Identification System (AIS) messages. Our RRoT method creates a reference route based on historical AIS messages. It utilizes some of the best trajectory similarity measure to identify the destination of a vessel using their recent movement. We evaluated five different similarity measures such as Discrete Fr´echet Distance (DFD), Dynamic Time Warping (DTW), Partial Curve Mapping (PCM), Area between two curves (Area) and Curve length (CL). Our experiments show that our method identifies the destination port with an accuracy of 98.97% and an fmeasure of 99.08% using Dynamic Time Warping (DTW) similarity measure.

Keywords : spatial temporal data mining, trajectory mining, trajectory similarity, resource optimization

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