

DSC-22 Analysis of Automatic Identification System (AIS) data to understand shipping and ports

2018-04-12

The off-course project explores the operation, use and relationships between ports in the UK at a macro level and the behaviour and operational characteristics of ships at a micro level. Specifically, we explored ship travelling behaviours, traffic at ports and related factors, port capacity utilisation, national and international port relationships and inbound ship delays.

Team members

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The need

The maritime freight industry is of critical importance to the economic output of the UK, with almost half a billion tonnes of freight being handled by UK ports in 2016. The Freight Transportation Association estimate that delays on both side of the Channel cost the UK logistics industry £750,000 a day. As the demands upon shipping freight are likely to increase in the future, a more in-depth understanding of the UK maritime shipping industry becomes increasingly more important.

This project explores the operation, use and relationships between ports in the UK at a macro level and the behaviour and operational characteristics of ships at a micro level, specifically:

- national and international relationships
- traffic at ports and related factors
- inbound delays
- capacity utilisation

Two sources of data are utilized:

- Automatic Identification System (AIS). AIS data records the position, speed, heading, bearing and rate of turn for each ship, at frequent time intervals throughout its voyage
- Consolidated European Reporting System (CERS). CERS data is collected at a higher level and records details such as destination port and expected time of arrival for the voyage of each ship

Impact

The main outputs of this project are: • processing pipeline of big data containing location of ships and reports containing itinerary information • port statistics based on several criteria • port relationships between UK and international ports • classification of ship travelling behaviour • prediction models for delayed arrivals of freight ships

Data science

- Development of Scala functions to decode, sort, filter and extract AIS messages.
- Visualisations of port statistics and network analysis. • Unsupervised machine learning algorithms to classify the ships' moving behaviour. • Supervised machine learning algorithms to predict if a freight ship is going to arrive delayed.

Stakeholders

- Maritime and Coastguard Agency (MCA)
- Department for International Trade (DIT)

Code and outputs

- Report on main website • GitHub public repository

Related and existing work

- ESSNET WP4

Delivery

- [x] **September 2017** Project started
- [x] **June 2018** Project finished

Further information

Please contact datasciencecampus@ons.gov.uk for more information.

Updates

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Chris Bonham and Sonia Williams produced a report detailing the process and outcome of this project in June 2018.