Maritime Data Integration and Analysis: Recent Progress and Research Challenges

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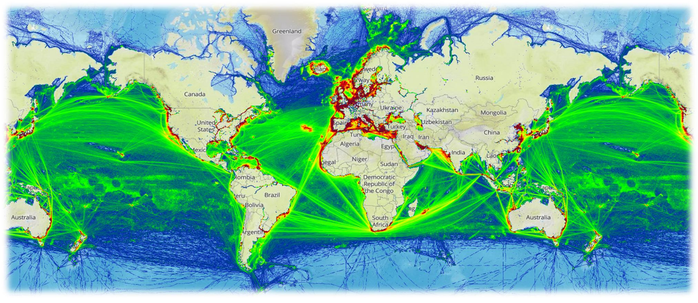


Online tracking, early recognition of events, and real-time forecast of vessels trajectories are crucial to safety and operations at sea !

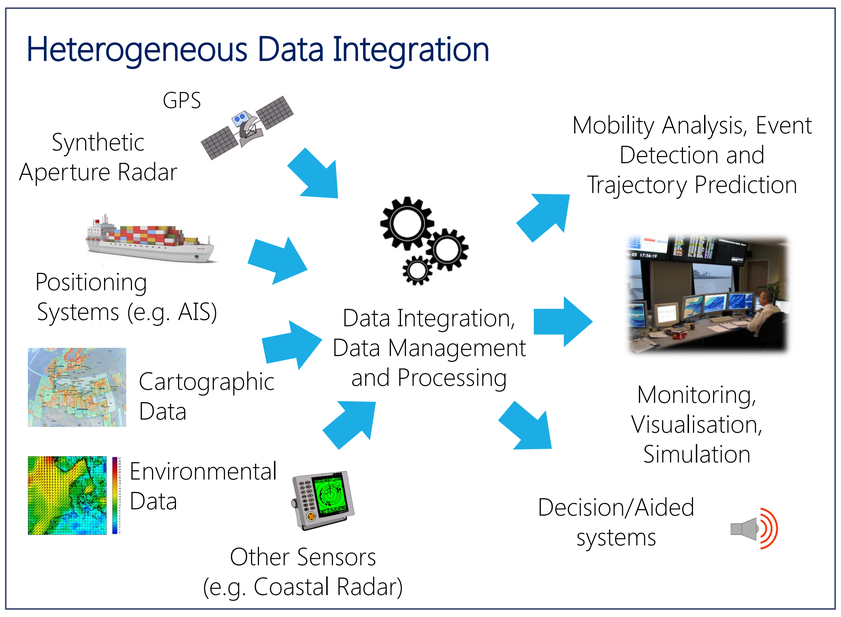
Objective is to review research challenges tied to the integration, management, analysis, and visualization of moving objects at sea as well as a recommendations for a successful development of maritime forecasting and decision-support systems.



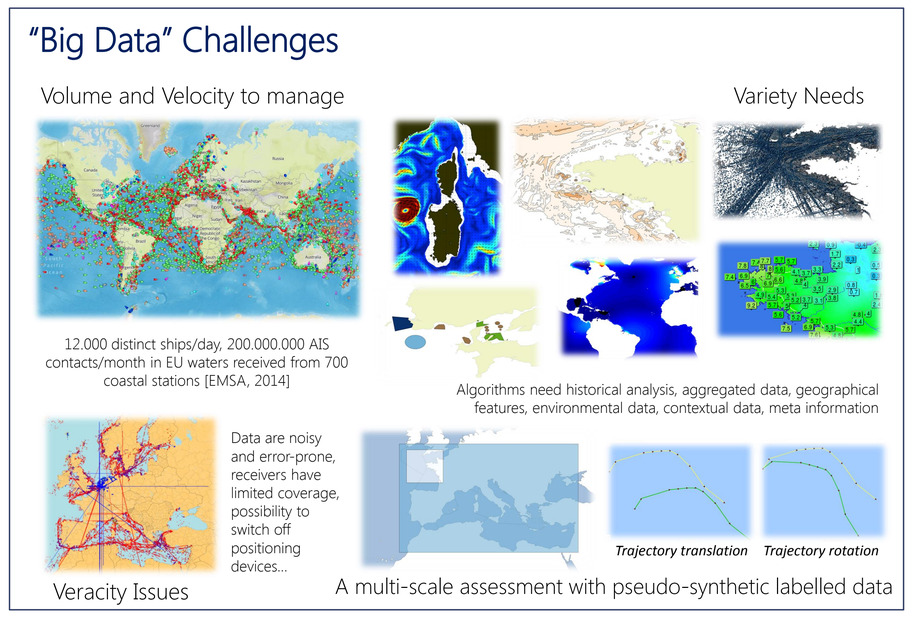




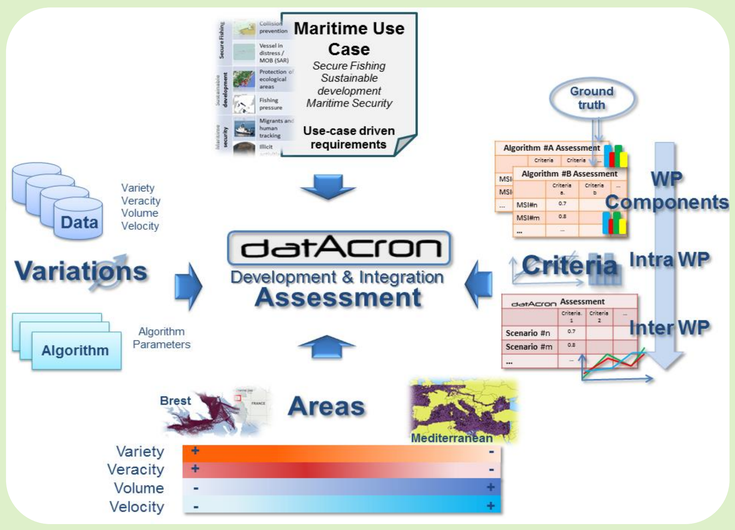
Heterogeneous Data Integration



"Big Data" Challenges



Methodology and Research Challenges for an Integration of Large Maritime Trajectory Data



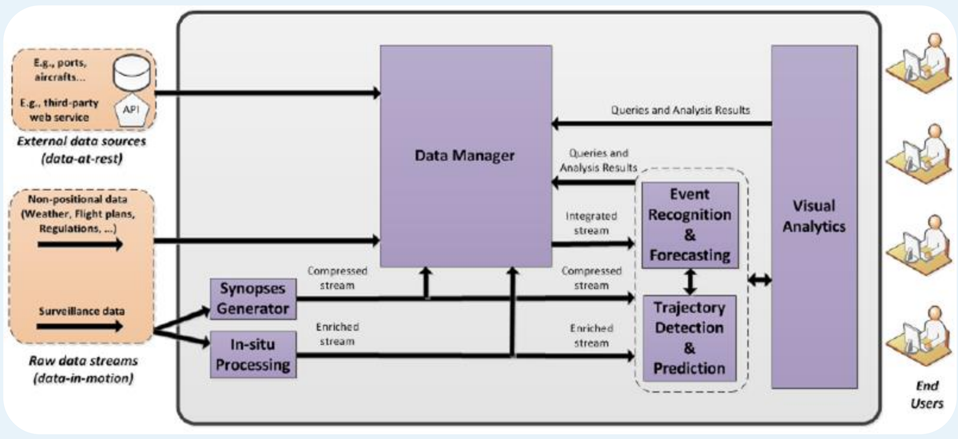
Integration of in-situ streaming data

Trajectories detection and forecasting

Recognition and identification of complex events

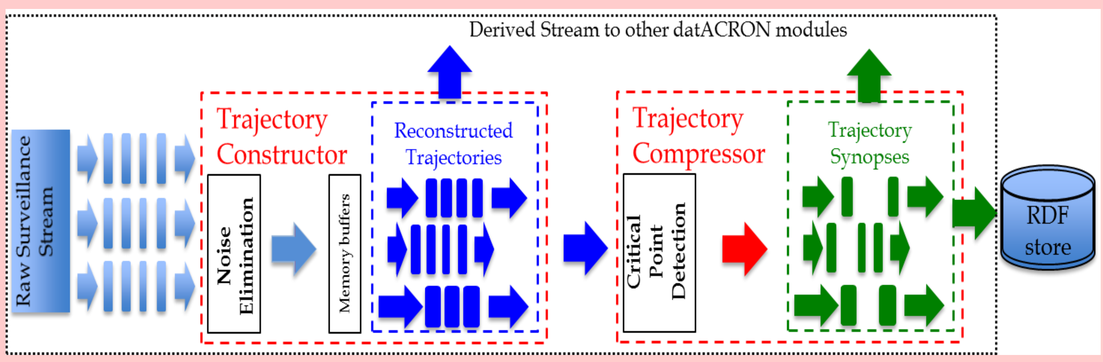
Development of visual analytics interfaces for maritime experts and decision-makers

Streamed-Based Architecture

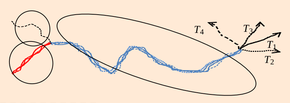


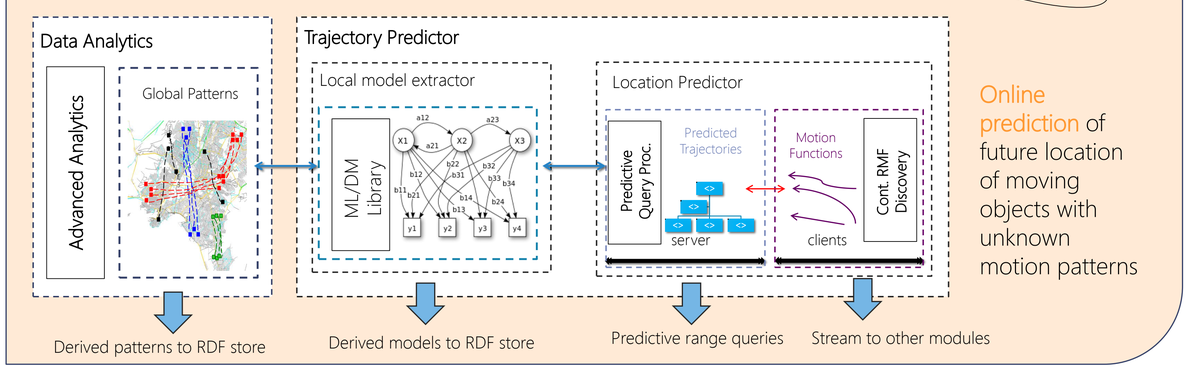
Four main data streams: *Raw streams* of surveillance data, *Compressed stream* (=trajectory synopses), *Enriched stream* (low level events), I*ntegrated stream* (synopses linked with other data)

Towards Data Synopses



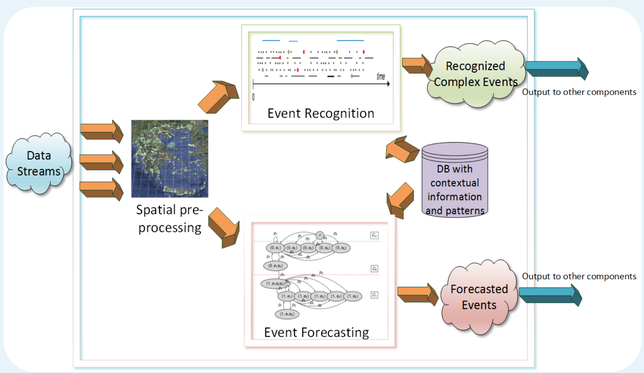
Trajectory Detection and Prediction





Online prediction of future location of moving objects with unknown motion patterns

Event Pattern Detection



Visual analytics & decision support systems