Big Data Analytics for Time Critical Mobility Forecasting

datAcron

Project Overview for ComplexWorld 2016 Data Science in Aviation Workshop Cologne, September 2016

datAcron project is funded by the European Union’s Horizon 2020 Programme under grant agreement No. 687591.
Project Background – EU Funding

• datAcron is an EU H2020 funded Project, under call ICT-16-2015 “Big Data Research”:
  • “(...) Collaborative projects to **develop novel data structures, algorithms, methodology, software architectures**, optimisation methodologies and language understanding technologies **for carrying out data analytics**, data quality assessment and improvement, prediction and visualization tasks at extremely large scale and with diverse structured and unstructured data. Of specific interest is the **real time cross-stream analysis of very large numbers of diverse, and, where appropriate, multilingual, multimodal data streams (...)**”

• ~150 proposals, ~10 accepted= ~7% success rate
Project Background – Alignement

• Technological developments will be validated and evaluated in user-defined challenges that aim at increasing the safety, efficiency and economy of operations concerning moving entities in the air-traffic management (ATM) and maritime domains:
  • Introducing novel methods to detect threats and abnormal activity of very large numbers of moving entities in large geographic areas.
  • To advance the management and integrated exploitation of voluminous and heterogeneous data-at-rest (archival data) and data-in-motion (streaming data) sources, so as to significantly advance the capacities of systems to promote safety and effectiveness of critical operations for large numbers of moving entities in large geographical areas.
Project Background – Consortium
datAcron main Objectives

• Scalable integration and management of data from disparate and heterogeneous sources.
• Real-time detection and forecasting of trajectories.
• Real-time event recognition and forecasting.
• Real-time interactive analytics.
datAcron high level architecture

Figure 1: datACRON overall architecture.
ATM use-case scenarios

dataAcron ATM use case aims to demonstrate how Big Data technology can help to increase the predictability of the ATM system (or decrease the uncertainty) thanks to a better trajectory and event prediction and forecasting. This improvements will lead to both better resource optimization of the ANSP’s and more revenue (efficiency) for the Airlines. The intensive use of historic and real time data for trajectory prediction and forecasting is the key enabler for these improvements. Two groups of scenarios will be used for the experiments in this use case:

• Flow Management Scenarios
• Flight Planning Scenarios

D6.1 Aviation Use Case Detailed Definition is available in project website.
ATM use-case scenarios

• Flow Management scenarios main objective is to allow better planning of the demand and capacity balance which will lead to less delays. Detection and forecasting of regulations and detection and forecasting of negative unbalance will be used to resilience assessment.
ATM use-case scenarios

Events to detect and forecast:
- D>C
- Regulation
- Resilience (as situations where D>C does not imply Regulations)
ATM use-case scenarios

• Flight planning scenarios main objective is to enhance the trajectory prediction to avoid plans prone to great deviations the day of operations. Detections of patterns in real final flights deviated from the original flight plan will be used to detect the flight plans with less probability to be fulfilled.
ATM use-case scenarios

DatACRON Trajectory prediction

Historical data + context data

Model Base Trajectory prediction

Surveillance Data

KOM 18-19/01/16
ATM use-case data

Both scenarios leverage the analysis of historic and/or real-time data related to:

• Flight Plans
• Context ATM data
• Surveillance data
• Weather data
• Flow Management data
• Synthetic trajectories

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D6.2 Aviation data preparation and curation (interim). is available in project website.
ATM use-case Interest Group

- You are welcome to join the ATM Use Case interest group.
- Just sent an email to receive updates on project progress specially related to the ATM scenarios and give feedback (NDA signature needed):

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Thanks!