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LESSONS LEARNED FROM BIG DATA MANAGEMENT OF WEATHER FORECASTING APPLIED TO SPACE SITUATIONAL AWARENESS (SSA)

Abstract

Volume, velocity, variety, and veracity are the hallmarks of data validation and management. And, due to the nature of space situational awareness (SSA), which seeks to gather, fuse, and characterize a large amount of information about colossal amounts of activity on Earth orbit, a number of key lessons can be learned from examining similar "Big Data" problems, methods of analysis, successes, and failures.

A key case study that the SSA community can learn from is the pooling, analysis, and distribution of Earth Observation data–and in particular, weather forecasting data processed by and for the National Oceanic and Atmospheric Association (NOAA). Most weather forecasting today is processed through an 'ensemble' approach, where disparate models and data sets are assimilated into a central hub for evaluation. The government cloud acts in a coordinator role, aggregating a forum for industry to bring together their different areas of expertise. Comparison and fact-checking of government data against commercial data allows operators and program officers on all sides to gain a clearer understanding of where discrepancies originate, as well as what assumptions are being built into each player's curation and analysis stages. This in turn builds trust in the outputs. As commercial SSA data providers and nations start to offer SSA data in new formats and from new sensor types, it is easy to imagine an SSA cloud architecture that takes a similar ensemble approach.

This paper will examine NOAA's approaches to weather data model design, implementation, and management. From this analysis, key observations - including advantages, challenges, and market gaps - will then be applied to investigate the current status quo of civil and commercial SSA program management, identifying key lessons learned for the improvement of core SSA system elements, including data inputs, fusion and integration, outputs in the form of products and services, and organizational expertise.