



Reading Between the (Shore)Lines: Real-Time Analytical Processing to Monitor Coastal Erosion

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With the far-reaching impact of Artificial Intelligence (AI) becoming more knowledgeable across various dimensions and industries, the Geomatics scientific community has reasonably turned to automated (in some cases, autonomous) solutions while looking to efficiently extract and communicate patterns in high-dimensional geographic data. This, in turn, has led to a range of AI platforms providing grounds for cutting-edge technologies such as data mining, image processing and predictive/prescriptive modelling. Meanwhile, coastal management bodies around the world, are striving to harness the power of AI and Machine Learning (ML) applications to act upon the wealth of coastal information, emanating from disparate data sources (e.g., geodesy, hydrography, bathymetry, mapping, remote sensing, and photogrammetry). The cross-disciplinarity of stakeholder engagement calls for thorough risk assessment and coastal defence strategies (e.g., erosion/flooding control), consistent with the emerging need for participatory and integrated policy analyses. This paper addresses the issue of seeking techno-centric solutions in human-understandable language, for holistic knowledge engineering (from acquisition to dissemination) in a spatiotemporal context; namely, the benefits of setting up a unified Visual Analytics (VA) system, which allows for real-time monitoring and Online Analytical Processing (OLAP) operations on-demand, via role-based access. Working from an all-encompassing data model could form seamlessly collaborative workspaces that support multiple programming languages (packaging ML libraries designed to interoperate) and enable heterogeneous user communities to visualize Big Data at different granularities, as well as perform task-specific queries with little, or no, programming skill. The proposed solution is an integrated coastal management dashboard, built natively for the cloud (aka leveraging batch and stream processing), to dynamically host live Key Performance Indicators (KPIs) whilst ensuring wide adoption and sustainable operation. The results reflect the value of effectively collecting and consolidating coastal (meta-)data into open repositories, to jointly produce actionable insight in an efficient manner.