Automated Solutions in the Offshore Marine Geophysical Data Processing

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SUMMARY

Artificial intelligence, machine learning and automation have become major areas of research and development in almost every field or industry, and the hydrographic industry is no stranger to this trend. Hand-in-hand with the advances in technology, an upturn in renewable energy sources and blue economy investments is causing increased industry demands. Although a cause for optimism, this tendency has a flip side. Scopes and dataset sizes increase in parallel with industry demands, but project timeframes do not adhere to the same trend. Thus, time – along with the associated cost – becomes an ever more essential resource for the hydrographic industry. Consequently, R&D solutions for the automation of laborious manual processes are crucial to the industry's progress in terms of data processing and management. The need for automation to enhance efficiency becomes evident in situations where, e.g., 10 data processors spend months manually detecting boulders from side-scan sonar or multibeam echosounder data or invest significant hours in manually adjusting geologic profiles.

Data processing software plays a significant role in achieving a high-quality and efficient approach to data processing, aiming to maximize effectiveness. Examples of such automatable processes are, e.g., sediment classification, detection of all three boulders' dimensions, pipeline eventing etc. which, the possibility of their automation notwithstanding, remain primarily conducted through manual labour. The key reason is the uncertainty of data quality obtained by automated processes, begging the question: in data processing, can automation surpass human intervention in terms of resulting data quality?

On the one hand, the mathematical approach utilized in the automated methods can be viewed upon as more reliable, avoiding the inconsistencies caused by differing personal interpretations or survey variations.

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On the other hand, no matter how reliable and efficient any of the automated tools are, human intervention is a fundamental part of this process, a paradigm which seems to be here to stay despite advancements in automation.

The human role in automated data processing is that of quality control and assurance. Of course, such a role, although significantly less time-consuming, requires the operators to be trained and empowered to perform structural and quality analysis of the automated solutions, becoming IT and data specialists, not just geophysical specialists.

One of the marine geophysical data processing activities prone to be automatized is the side-scan sonar object detection, a process especially slow and cumbersome in boulder field areas.

The prospective of making data processing activities more efficient is real. Although automated processing solutions enable faster obtainment of results, recognizing the role of human intervention is crucial, especially in quality control and assurance. This applies particularly to the boulder detection process, which is often a time-consuming, slow manual process that requires automation intervention to save resources.