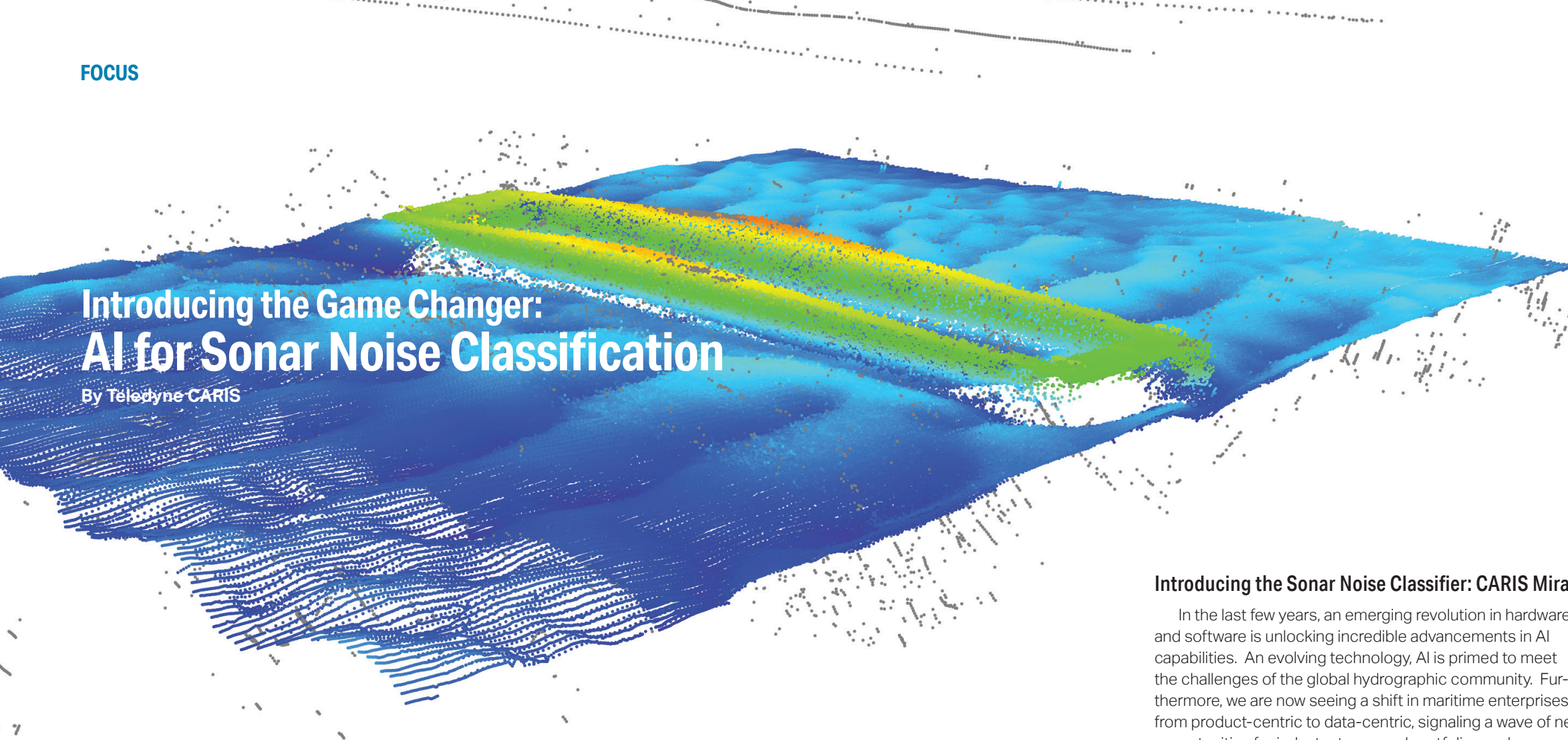


Introducing the Game Changer: AI for Sonar Noise Classification

By Teledyne CARIS



At Teledyne CARIS, you don't have to dive deep to find professionals passionately committed to the exploration, preservation and mapping of the world's ocean. In addition to lending technical expertise to several international geospatial hydrographic organizations, we are inspired and motivated by the community we serve.

Whether in the private or public sector—and whether the application is in commercial oil and gas or habitat mapping—every agency involved in seafloor mapping is under mounting pressure to collect more data with increasing accuracy and efficiency. The hardware market has responded in kind with a range of options for improving quality, coverage, and accuracy while reducing or maintaining costs.

The last decade has seen a significant rise in ocean robotics and their part in augmenting marine surveys. As a result, an unprecedented deluge of raw data is streaming to users around the clock. Suddenly, there was a new challenge to address. While hydrographers gained access to vast volumes of data, they were limited by how much data can be manually processed within each working day.

More recently, the launch of ocean mapping initiatives, such as GEBCO's Seabed 2030 project, has inspired the design of new AI-powered tools and solutions to support efforts to map the world's entire ocean by 2030.

As data volumes began to grow to the point of critical mass, Teledyne CARIS began curating a software solution that would prove to be a game-changer. The first of these tools brought to you by Teledyne CARIS effectively classifies noise in sonar data using a Cloud-based system, vastly reducing the manual effort needed to clean datasets. This functionality allows more energy to be focused on other, higher-value aspects of the production chain and, ultimately, increases the availability of data.

Designed to support remote operations, Teledyne CARIS invested considerable effort in rolling out workflow automation tools that enable users to apply automated processes to data in near-real-time, resulting in minimized data conversion and processing times. Users can assemble simple or complex workflow models to—almost wholly—automate the steps they need to get from survey to product.

Since the launch of this system, dozens of success stories have emerged from users demonstrating how much time, effort, and resources can be saved. Going a step further, Teledyne CARIS responded to feedback highlighting the next data challenge users face after automating their workflow. Once they get all of the corrections organized and generate geo-referenced data from their survey, users still had to spend massive amounts of time reviewing data to remove 'noise' before data products could be produced.

Introducing the Sonar Noise Classifier: CARIS Mira AI

In the last few years, an emerging revolution in hardware and software is unlocking incredible advancements in AI capabilities. An evolving technology, AI is primed to meet the challenges of the global hydrographic community. Furthermore, we are now seeing a shift in maritime enterprises from product-centric to data-centric, signaling a wave of new opportunities for industry to expand portfolios and grow new business.

When leveraging and deploying this AI capability in the Cloud, users can benefit from the incredible leap in processing power with an effectively limitless amount of computing power at their disposal. However, first, we must teach AI to recognize and remove noise from datasets, which is no easy task.

Even for poor-quality datasets, the noise in the data typically represents less than five percent of the total data volume. In AI lingo, this is an "imbalanced" dataset and AI algorithms will struggle to learn from so few relative examples. Therefore, the traditional approach of simply 'throwing' enormous amounts of data into the learning algorithm could not be used.

To train the Sonar Noise Classifier, Teledyne CARIS sourced a variety of public datasets. After the team painstakingly cleaned them by hand, each dataset was reduced down to a few representative samples with enough noise representation that the AI could learn to recognize those patterns. Developers took great care to ensure there was good representation across a variety of common noise patterns from different types of sensors.

The CARIS process is to ingest the processed data, anonymize it, compress it and send it to the Cloud. The neural network analyzes the data, generates the results and passes it back to the local machine and user. AI can be applied to

legacy data as well as embedded as part of project design for new projects, enabling businesses to seamlessly transition to incorporating the technology where possible.

CARIS Mira AI provides insights regarding a multitude of data, allowing the hydro professional to define with precision parameters such as what is noise and what is real; and characteristics, such as where the seafloor is sandy or rocky, or where there is a shipwreck. In consideration of future requirements, the next step will be the detection, classification, and determining of objects.

Figure one shows an example of a typical harbor survey involving approximately 200,000,000 points and about ten hours of survey time. For this particular project, it took approximately six hours to clean by hand, three hours using a traditional grid filter workflow, and just under an hour using the Sonar Noise Classifier.

Teledyne CARIS has seen its Sonar Noise Classifier being deployed across a variety of end-users in the hydrographic space who are experimenting with its efficiencies in their everyday work and determining the impact in making the most of their valuable time.

The Sonar Noise Classifier is just the first of many AI applications envisioned for the broader CARIS Mira AI platform. Teledyne CARIS already has noise classifiers for other domains, specifically topographic and bathymetric lidar, which will be released on the platform shortly, as well as a few other surprises in the works.

Excited to promote the game-changing efficiencies found in CARIS Mira AI, the team has embarked on a limited-time promotion to engage and encourage the community to test drive the Sonar Noise Cleaner with a free 30-day trial of its renowned HIPS Essential including the Sonar Noise Classifier. Visit www.teledynecaris.com for more details.

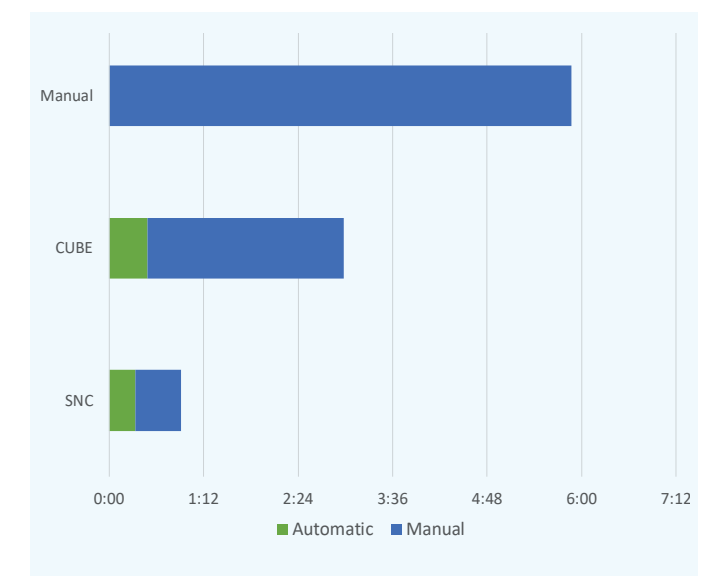


Figure 1: Cleaning Time