CASE STUDY

AI-ENABLED CORROSION DETECTION FOR AMERICAN BUREAU OF SHIPPING

Client Background

American Bureau of Shipping (ABS), a leading global provider of classification and technical advisory services to the marine and offshore industries, is committed to setting standards for safety and excellence in design and construction. Focused on safe and practical application of advanced technologies and digital solutions, ABS works with industry and clients to develop accurate and cost-effective compliance, optimized performance and operational efficiency for marine and offshore assets.

Business Challenge

Visual inspection is an important component of marine and offshore asset management. However, applying artificial intelligence (AI) models to detect levels of corrosion and coating breakdown on ships and offshore structures can reduce required manhours and may increase the safety of inspection operations.

ABS' long-term goal is to leverage advanced technologies for precise and efficient remote surveying. The ability to identify corrosion from surface images is a first step to achieving this goal. ABS plans to leverage remote inspection technologies (including drones) to perform remote inspections and detect in real-time corroded areas that require additional attention. Furthermore, by capturing the history of corrosion progression, ABS may predict required inspections more precisely by using historical data and prediction modeling.

Additionally, ABS seeks to promote its innovation capabilities and create brand awareness at industry events.

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Project Description

As a first step to realizing these long-term project visions, ABS, Google Cloud, and SoftServe collaborated to develop a proof of concept to demonstrate the feasibility of AI-enabled corrosion detection, by combining automatic structural anomaly detection and remote inspection for improved monitoring.

There were three areas where AI was applied within this project in order to increase operations efficiency:

- Corrosion segmentation
- General classification of coating conditions
- Vessel components breakdown (stiffener, edge, weld lines)

ABS provided labelled data for the training of the AI models and subject matter expertise.

Through a Data Exploration, SoftServe conducted:

- Analysis of available data sources to assess state of data and potential usefulness in applying in a machine learning (ML) model
- Data characteristics analysis
- Data quality assessment for cleanliness, potential correlation, and patterns
- Check for class imbalance
- Validation of hypothesis relative to data
- Research modeling strategies to determine appropriate ML algorithm to address problem
- Algorithms selection based on hypothesis, type of features, patterns in data

Tools and Technologies

- DataLab/Jupyter Notebook on Compute Engine for orchestrating and running jobs on AutoML and CloudML
- Google Cloud Storage for training and test data storage
- Google Repositories to store and manage source code
- Vision API for extracting additional feature from the images

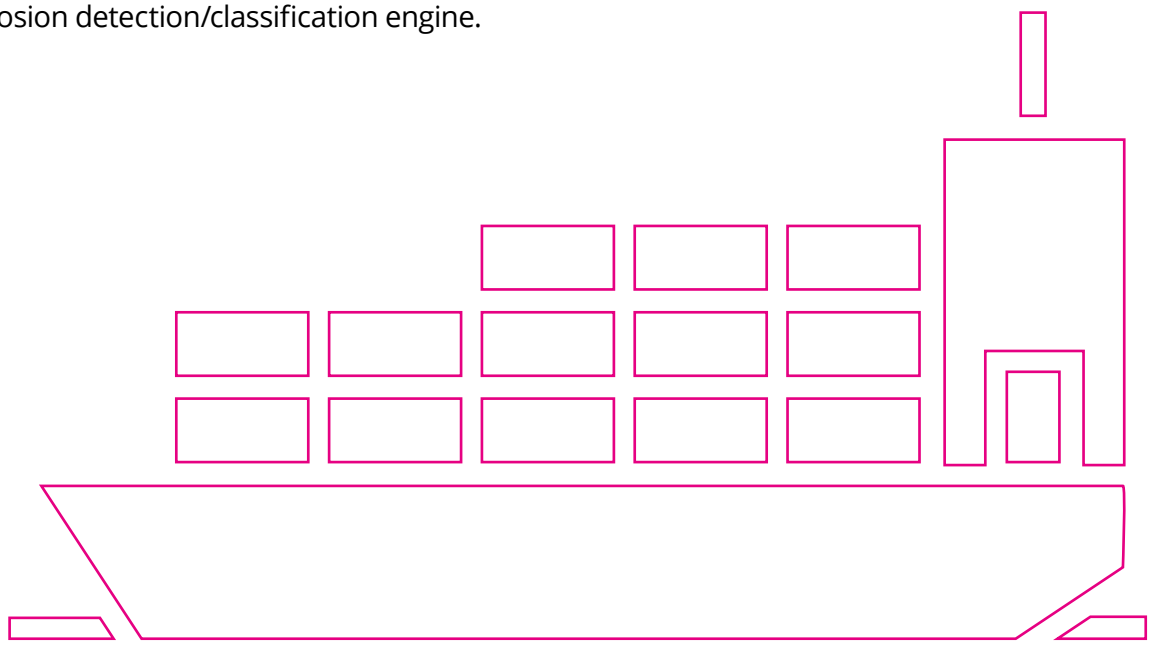
Value Delivered

The developed solution provides the data analytics component of a comprehensive inspection system for marine and offshore structures that consists of data collection tools (UAVs, ROVs), a digital model of the asset where collected data is mapped (stored), and tools to analyze the data and make decisions.

The solution that was designed and proven in this Proof-of-Concept is significant for demonstrating the feasibility of leveraging cloud-based AI tools to build an offshore inspection system that is safer, more efficient, and more accurate than traditional methods. SoftServe's innovation process, Google Cloud's technology, and ABS' domain expertise each combine to accelerate the innovation process to create a vision of the future of remote inspection technology.

A feasibility study was successfully completed and the implementation of a more robust model is expected to be used as a part of corrosion detection/classification engine.

ABS asked SoftServe's R&D team to create an interactive game app for iPads so that conference visitors could experience selected rust assessing activities and how the 'AI assistant' performs requisite tasks faster and more accurately. SoftServe delivered the iPad game mobile application with the backend Google Cloud service that demonstrated how AI may revolutionize the rust monitoring industry in future through a specialized interactive experience designed and optimized for the use at exhibitions. The game debuted at the Offshore Technology Conference (OTC) in May 2019 with 60,000 visitors in attendance and is slated to be demonstrated at worldwide exhibitions.



ABOUT US

SoftServe is a digital authority that advises and provides at the cutting-edge of technology. We reveal, transform, accelerate, and optimize the way enterprises and software companies do business. With expertise across healthcare, retail, media, financial services, software, and more, we implement end-to-end solutions to deliver the innovation, quality, and speed that our clients' users expect.

SoftServe delivers open innovation—from generating compelling new ideas, to developing and implementing transformational products and services.

Our work and client experience is are built on a foundation of empathetic, human-focused experience design that ensures continuity from concept to release.

We empower enterprises and software companies to (re)identify differentiation, accelerate solution development, and vigorously compete in today's digital economy—No matter where you are in your journey.

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