FUJITSU

Singapore MPA

Reducing risk on the high seas

Singapore MPA is using Fujitsu Human Centric AI Zinrai to detect ship collision risks and predict areas where these risks are concentrated as dynamic risk hotspots. It provides information to the MPA, maritime traffic controllers in Singapore and vessels, which can then recognize the risk and strategically adjust their maneuvering to avoid it. This risk detection technology was able to quantify risk in more detail, in advance, than human operators.

Challenge

MPA wanted to develop an AI platform that would proactively identify potential collisions for vessels at sea.

Solution

Fujitsu built a new ship collision risk prediction solution based on AI Zinrai.

Outcomes

- Detected vessels at risk and provided useful information so ships can adjust their maneuvering to avoid danger
- Flagged potential risks approximately ten minutes before an incident could occur and provided traffic controllers with five minutes' lead time to warn ships.

"Fujitsu has built a new ship collision risk prediction technology that leverages the power of artificial intelligence to predict near misses between vessels."

Representative, Maritime and Port Authority of Singapore

About the customer

The Maritime and Port Authority of Singapore (MPA) was established in 1996 to develop Singapore as a premier global hub port and international maritime center (IMC), and to advance and safeguard Singapore's strategic maritime interests. MPA is the driving force behind Singapore's port and maritime development, taking on the roles of Port Authority, Port Regulator, Port Planner, IMC Champion and National Maritime Representative.

5 minutes
lead time flags potential collision risks

Making congested ports collision-free

Congestion at ports worldwide has become a serious issue as managing traffic safely has become more difficult. In 2014, for example, there were 1,642 serious vessel incidents and 358 collisions – almost one per day. However, research conducted by Japan's Ministry of Land, Infrastructure, Transport and Tourism shows that only 10% of vessel accidents are caused by a mistake in maneuvering, whereas 90% are caused by a mistake in recognition and judgment. That suggests that reducing human error would make the waterways much safer.

Globally, the Vessel Traffic Service (VTS) systems, which manage marine traffic, rely on anti- collision warning, using closest point of approach techniques to detect and notify ships when vessels get unusually close to one another. As vessel operations and interactions become more complex, the ability to detect and predict vessel movements in advance, especially in high density vessel traffic areas like Singapore, is key to managing and reducing collision risks.

Introducing AI to predict collisions

In response, Fujitsu has built a new ship collision risk prediction technology that leverages the power of artificial intelligence (AI) to predict near misses between vessels. It uses Fujitsu Human Centric AI Zinrai to detect ship collision risks and predict areas where collision risks are concentrated as dynamic risk hotspots. This technology has the potential to be deployed in VTS systems to assist maritime traffic controllers in managing marine traffic proactively with the aim of improving the safety of navigation.

Fujitsu conducted its research and testing with the assistance of about 10 MPA officers from the Vessel Traffic Management Department and Port Systems Division over 24 months. Drawing on past traffic data for the Singapore Strait provided by MPA, Fujitsu used its collision risk prediction technology to extract information, such as examples of collisions or near misses involving multiple vessels, as well as examples of developing dynamic risk hotspots.

Faster, clearer, safer

The new Fujitsu technology proactively detects vessels at risk and provides useful information to both maritime traffic controllers and vessels. Vessels can then recognize the risk and strategically adjust the maneuvering to avoid it. This risk detection technology demonstrated the ability to quantify risk in more detail in advance of the detection by human operators.

For example, based on benchmarking studies, the detection technology was able to flag potential risks approximately 10 minutes before the near-miss, and in doing so, would theoretically provide approximately five minutes lead time for human operators to execute the necessary follow-on action, such as the provision of advice to the vessel. Fujitsu's technology was also able to pick out scenarios where the collision risk could be overlooked and raise the alert to a possible collision incident. Separately, the dynamic risk hotspot detection technology could detect hotspots up to 15 minutes in advance, enabling staff to take specific measures to avoid an incident.

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