SUGGESTING WAYPOINTS TO AUTONOMOUS SURFACE VESSELS (ASV) FOR EFFECTIVE EMERGENCY RESPONSE USING MACHINE LEARNING

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Abstract

With the advancements in the maritime industry, which delivers almost 90% of the world trade, the frequency of maritime activities has drastically increased resulting a major concern in maritime safety. According to the latest accident investigation publication by European Maritime Safety Agency (2018), there had been a total of 10,384 maritime accidents reported causing 297 deaths, 273 very serious casualties and 127 ships sunk during the period from 2015 Q1 to 2018 Q2 within the European Union only. A recent research by Zhang and Li (2017) has discovered that a significant 30% of maritime accidents are caused due to bad weather conditions like sea storms which was further researched by Goerlandt et al. (2016) and Bitner-Gregerse et al. (2016) and strong winds caused due to high turbulence and high waves as discussed by Maritime Injury Center (2019). These deaths and casualties would have been minimized if there was a mechanism for efficient emergency response as discussed by Wróbel et al. (2017).

ASVs have been used for several disaster mitigation and recovery operations in hurricanes such as Wilma (2005), Ike (2008) and the Tōhoku earthquake and tsunami (2011) according to Xiao et al. (2017). Therefore, ASVs could be used for emergency response since they are comparatively cheap and safe to be deployed on to hazardous zones in the deep sea since they have long term marine presence because they are mostly powered by wave energy, solar energy and wind energy as discussed by Meinig et al. (2015) and Zhou et al. (2015). A more efficient way for emergency response by the ASV would be, the ability to predict a location where there is a possibility for an accident to take place and position itself such that it could effectively respond to the emergency. Hence the author is proposing an optimal solution using machine learning techniques to suggest the waypoints to ASVs for effective emergency response on human operated surface vessels.