Protecting Critical Aquatic Ecology with Deep Learning

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Fishing is one the most significant drivers of declines in ocean wildlife populations. Overfished stock numbers have nearly tripled in half a century and a third of the world's assessed fisheries have been pushed beyond their ecological limits. Scientists regularly assess fish stocks to provide critical information for conservation and management. Mandatory implementation of Vessel Monitoring Systems (VMS) on all commercial vessels has allowed for Satellite-Automatic Identification System (S-AIS) data to be captured efficiently, without the logistical difficulties of putting government supervisors on ships. However, immense volumes of data have been collected, requiring manual processing, and significant time, labor, and money. The use of deep learning to automate fishing detection has substantial benefits but is currently limited solely to proprietary methods. This project proposes a method of training a publicly available, deep learning-based fishing detection model, with accuracies greater than 90%, and plotting of detected fishing locations on a global map. Publicly available, anonymized S-AIS datasets for trawler and longline vessel types were utilized. Once the S-AIS data was pre-processed, it was used to develop the Convolutional Neural Network (CNN) models for both vessel types, resulting in 94% and 86% efficacy for the trawler and longline vessel types, respectively. Further, these detected fishing locations were plotted on a global map. These publicly available deep learning models and detected fishing locations on a comprehensive world map will help aquatic ecologists, governments, and fishery managers to rebuild fisheries and protect critical aquatic ecology.

Awards Won:
Second Award of $2,000