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Transfer learning for multi-frequency synthetic aperture radar applications

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Abstract

To correctly train a system to detect ships in Sythetic Aperture Radar imagery requires the creation of a validated dataset. This dataset is used to train a Machine Learning system to identify ships and non-ships. Recent advances in Deep Learning have focused on Transfer Learning which uses characteristics from one dataset to classify another without retraining the system. In this work two Deep Learning architectures were trained on lower resolution C-band SAR ship data and then tested against an unseen set of higher resolution Xband SAR ship data. Transfer Learning allowed the system to correctly identify 81% of the ships and 93% of the unseen data. This represents a possible reduction in the amount of effort required to curate new SAR datasets in the future by pre-identifying likely candidates as ships or non-ships.