Title: Oil Spill Detection over the Ocean Using Multiscale Deep Neural Networks

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Abstract:
Ocean oil spills have the potential to become a serious threat for the marine environment if not detected promptly. Tons of crude oil have been (and still) dumped into the ocean, causing severe damage to marine life with severe and economic development. Despite numerous efforts of the scientific community, an accurate detection and time monitoring of oil spills is still a difficult task. This is mainly due to the difficulty to monitor vast areas of the ocean in a time continuous manner. Despite of this, spaceborne radar sensors has proven to be an effective technique for improving the monitoring of ocean oil spills thanks to its wide area surveillance mode of operation at different climate conditions. However the interpretation or classification of satellite radar images still have some degree of uncertainty, depending in general on the ocean surface wind speed and oil thickness.
Deep learning models have achieved high rates of success in this field by incorporating hundreds of successive layers, making possible to solve very complex problems. In this work we present some recent advances of our research in oil spill detection over the ocean, and show a comparative results of different encoder models to extract and fuse semantic and spatial information at different levels using Feature Pyramid Network (FPN). FPN allows the extraction and combination of features at different levels by processing the input image at multiple resolutions simultaneously. In this way, the feature extraction process is balanced between detailed image semantics and high spatial representation, leading to better results in the final segmentation. We applied our methodology to Envisat and Sentinel images with different oil spill spatial resolutions and extensions, obtaining outstanding classification performance.

Biography:
Rogelio Hasimoto-Beltran received his B.S. in Oceanology (with honors) from the University of Baja California, México, in 1985 and his M.S. in Computer Science from the Center for Scientific Research and Higher Education at Ensenada (CISESE), Mexico in 1990. He received the Ph.D. degree in Computer and Electrical Engineering from the University of Delaware, USA in 2001. After his Ph.D., he spent two years at Akamai Technologies (a leader enterprise in Multimedia Content de- livery) as a Senior Software Engineer. In 2003, Dr. Hasimoto joined the Department of Computer Sciences at CIMAT where he currently serves on the rank of Professor/Researcher. He has been visiting associate professor at the University of Illinois at Chicago (UIC) during 2009–2010. Dr. Hasimoto has published over 60 technical papers in refereed conferences and journals in the area of image processing, computer vision, and

multimedia networks. His current research interest includes Robust Multimedia Communication, Chaotic Encryption, and Remote Sensing of Oil spill Detection and Monitoring over the Ocean.

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