FINDING HUMAN IN CHALLENGING ENVIRONMENT

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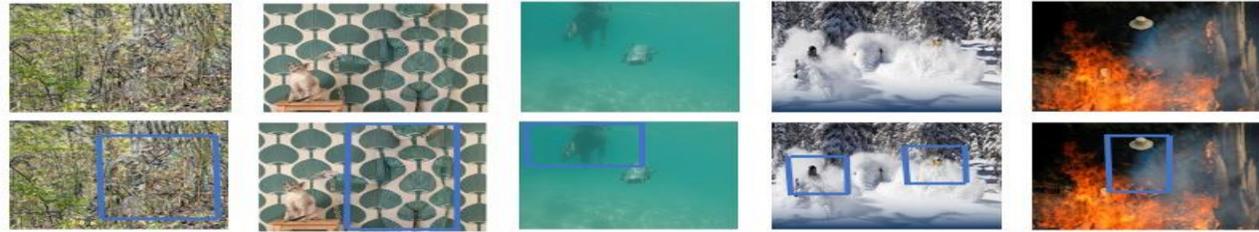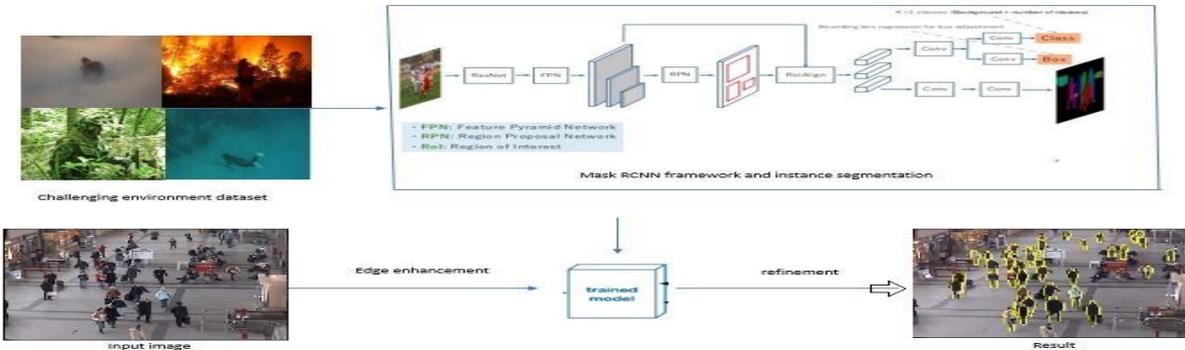Sankarshan Dasgupta (dasguptas2) under guidance of Tam V. Nguyen (tnguyen1@udayton.edu)

Dataset

Example of newly created dataset and corresponding human detection in challenging environment.

Natural habitat has a unique way to camouflage the surroundings with debris after serious calamities. Disaster areas are usually affected by falling tree debris, collapsing structures, and others that make spotting victims in need of rescue very difficult. Human detection aims to predict the existence of human instances and localize the human instances in a given image.

Deep learning neural networks
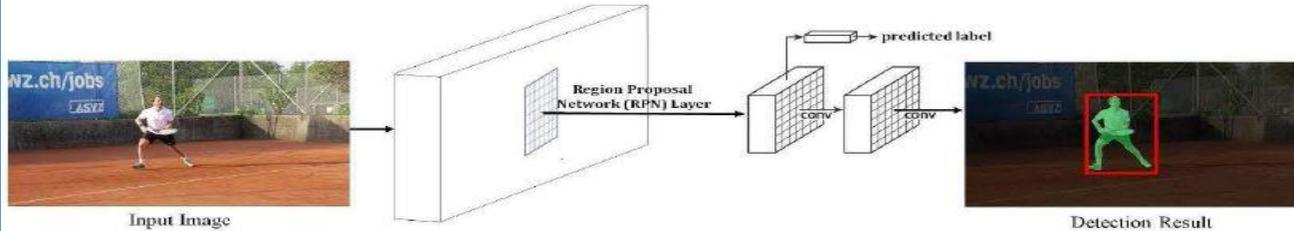
Above figure shows the flowchart of Mask R-CNN, the state-of-the-art deep neural network for the task of the object detection/segmentation. The Region Proposal Network layer proposes candidate objects at predefined scales and aspect ratios from the output of the neurons from the previous layer. The RPN layer then extracts features from each object bounding box and sends them to the convolutional layers.

Detection

Ultra-metric Contour Map (UCM) or similar technologies to preprocess images, and then use preprocessed images to boost up Mask R-CNN performance. The outline of an object helps us to distinguish an object from its surroundings. Figure (left) shows the impact of edge detection methods
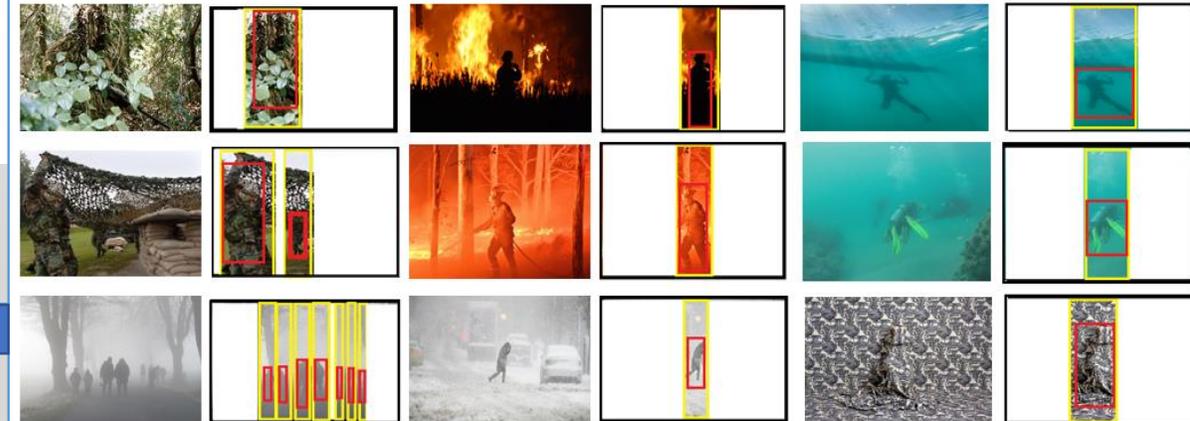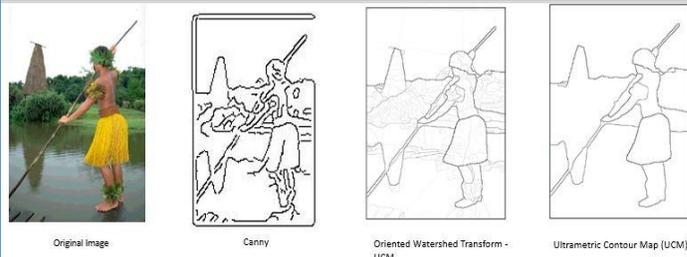
Proposed Model

The Proposed Method and implementation based on Edge Detector and Object Detector. The pixels of the training image are fed into the network to generate the class label. Mask R-CNN significantly boosts the performance of the object detection task.

Network Output

In **object detection**, we usually use a **bounding box** to describe the target location. The **bounding box** is a rectangular **box** that can be determined by the x and y axis coordinates in the upper-left corner and the x and y axis coordinates in the lower-right corner of the rectangle.

Reference: Kaiming He, Georgia Gkioxari, Piotr Dollar, Ross B. Girshick, "Mask R-CNN". In IEEE International Conference on Computer Vision (ICCV),2017, pp. 2980–2988.