

Overview:

With climate change, the frequency of extreme weather events is expected to increase. Following natural disasters, such as Hurricane Maria in Puerto Rico or the 2018 California wild fires, time is of the essence. When it comes to disaster recovery, response teams must be quick and efficient, making it crucial that response teams know precisely where to prioritize their rescue operations and relief efforts. Unfortunately, most existing disaster mapping efforts are done manually, which is not only time-consuming, but can also be prone to error. To this end, the goal of this project is to utilize unsupervised learning to increase the speed and efficiency with which we identify areas of maximum damage following a disaster.

Data/Methodology:

To tackle this problem, I plan to obtain basic aerial imaging data from the [Inria Aerial Image Labeling Dataset](#) and [SpaceNet](#) to train a semantic segmentation model via convolutional neural networks to extract man-made features, such as roads, buildings, rivers, etc. I found one study that utilized a Residual Inception Skip network, though I will also look into utilizing a U-Net architecture. This will be my MVP.

Once I am happy with the model performance, I will collect data from sources such as the [European Space Agency](#), [Digital Globe](#), or [NASA](#) which contain satellite imagery from both before and after a natural disaster. Once these images are run through the trained model, I should be able to identify changes to an area's geography by calculating the difference between segmentation masks. On a high level, response teams should focus their efforts in the areas where the model had trouble identifying features following a natural disaster, where it did not before the disaster, suggesting that this particular area has been severely damaged. Upon completing the lectures on neural networking later this week as well as some additional research, I will have a better idea of how I will tackle this problem. If you have any suggestions in the meantime, please let me know.