

Motivation and About the Project

After a hurricane in populated as well as sparse areas of human settlements, the very next thing after human rescue is the **damage assessment**. This is very critical for emergence managers as it helps them in **efficient response and proper resource allocation**. The only way for doing this is using ground survey or drones to manually quantify the number of flooded or damaged buildings. But this process being **highly labour intensive and time taking**, other efficient and faster methods have to be developed.

Model

- **Custom Model**- A CNN model made from scratch with regularization.
- **VGGNet Model**- It is a CNN used for “Very Deep Convolutional Networks for Large-Scale Image Recognition”
- **ResNet Model**--ResNet is a way to handle the vanishing gradient problem in very deep CNNs. They work by skipping some layers.
- **Inception model**- It is an image recognition model that has been shown to attain greater than 78.1% accuracy on the ImageNet dataset.

Creating an image data pipeline: To access images as datasets, do necessary transformations and prefetching for optimal utilization computing resources.

Building model architecture: Creating layer by layer whole CNN network in case of custom model or importing a SOTA model, customizing it and compiling it on MultiOptimizer.

Training of model using the dataset

Extracting inferences and comparison of model performances: For both balanced and unbalanced test sets.

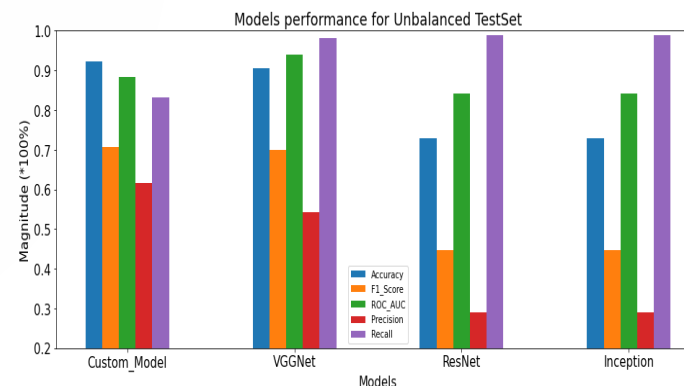
Visualizing which part of the image model uses to make its prediction: Using both Saliency Mapping and GradCam.

Data and Labels

- **train_another:** The training data; 5000 images of each class(damage/no damage)
- **validation_another:** The validation data; 1000 images of each class(damage/no damage)
- **test_another:** The unbalanced test data; 8000/1000 images of damaged/undamaged classes
- **test:** The balanced test data; 1000 images of each class(damage/no damage)

Results

	Precision	Recall	F1_Score	ROC_AUC_Score	Accuracy Score
Custom_Model	0.614760	0.833	0.707431	0.883875	0.923444
VGGNet	0.542289	0.981	0.698469	0.938750	0.905889
ResNet	0.289058	0.988	0.447261	0.842125	0.728667
Inception	0.289058	0.988	0.447261	0.842125	0.728667



Conclusion

For the balanced dataset,
Inception >> ResNet & VGGNet
**our custom model performs poorly.*

For the unbalanced dataset,
Custom Model >> VGGNet
**ResNet and Inception model perform poorly*

References and Future Work

To test our model further we can use the data collected from [Hurricane Delta](#) - Note this is satellite imagery as well, but the images are not specifically of buildings but also of water bodies and land.