Univ.AI

Classifying buildings Post Hurricane using Satellite Imagery

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Motivation and About the Project

Traditionally, hurricane damage assessment is conducted through field reconnaissance, where damage information is visually captured. But this is very time consuming and sending help to those who are in need can take much time.

So, we will try to make a Convolutional Neural Network that will classify the Damaged and No Damaged house's images which were taken from satellite. It would be very time efficient and for sending help to someone in need.

Here we have a dataset containing the Damaged and No Damaged house's images. We will build CNN classifier which will best classify the two sets of images. The CNN classifier could see the house's structure, if there is water nearby house or trees are on and around the house due to Hurricane.

Data and Labels

1. Here the dataset has anonymous building/houses with Damaged and No Damaged label.
2. In some images it's much hard to get house is damaged or not just only by looking house structure.
3. In some images it is hard to get water /tree around the house is due to hurricane or it's river or dam nearby.

References

Paper written by cao & choe for classification of Detecting Damaged Buildings on Post-Hurricane Satellite.

Model

We build different convolutional models for predicting Damaged and No damaged class.

1. we started with AlexNet Architacture.
Then we tried AlexNet with image sharpening.

2.VGG16 model

3.Xception model

4.Self Motivated Model

5.Cao and Choe (from papers)

Results

Model Architecture	Test Accuracy	Recall
AlexNet	0.8535	0.8520
AlexNet with Sharpened Images	0.832	0.842
VGG16	0.857	0.857
Xception	0.8920	0.8920
Self Motivated Model	0.810	0.82
Cao and Choe	0.9729	0.97

Conclusion and Future Work

From the above table, We found that our Xception model applied through Transfer learning performed better on test set and give accuracy of 89%.
And Xception Architecture best at identifying flood damage

For undamaged buildings we see that the model looks for edges of houses to determine whether the image shows flood damage or not.
Similarly for damaged buildings we see that the water and trees are a significant factor in detecting flood damage.

Also, our Self Motivated Model performed well and gives 81% test accuracy.

We can go for Cao and Choe model which gives 97 on their paper.

In future work we can use feature extraction and data augmentation and setting sharpening/contras in images for better guessing surrounding or water.