# Post-Disaster Segmentation using FloodNet

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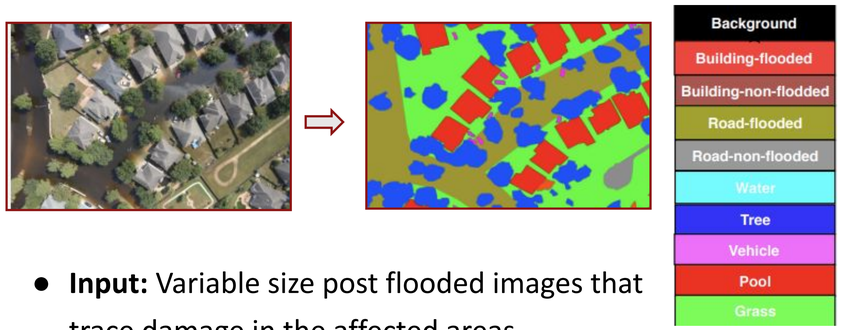
## Introduction & Problem Statement

- **Motivation:** Post-disaster visual parsing crucial for swift and effective response + vulnerability analysis planning.

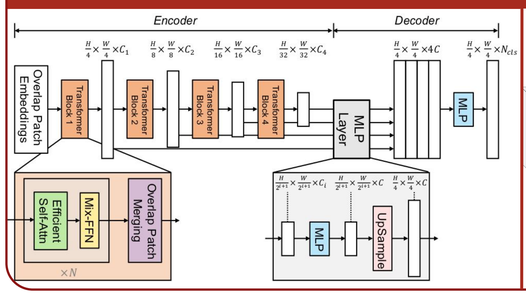



- **Input:** Variable size post flooded images that trace damage in the affected areas.
- **Output:** Semantic segmentation maps for 10 classes.
- **Metric -** Jaccard index (IoU) = $\frac{\text{Ground truth} \cap \text{Prediction}}{\text{Ground truth} \cup \text{Prediction}}$

## Methods

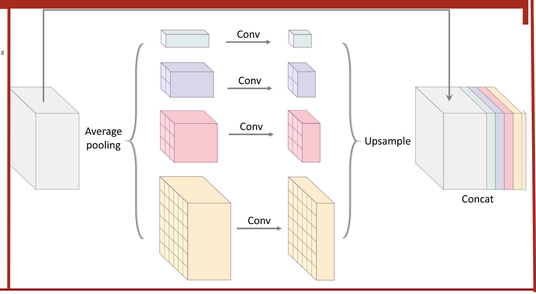
### SegFormer

Hierarchical encoder produces multi-scale features and larger effective receptive field. Lightweight, computationally inexpensive, MLP based decoder. Produces fine-grained masks at object boundaries.




### PSPNet

Pyramid pooling to make global context prior. Performs sub-region average pooling on features to fuse local and global context. Uses auxiliary loss to speed up training. Initial feature maps from Xception.




### DeepLabV3

Atrous convolutions for denser features and multi-scale resolution

### UNet

Encoder-decoder like architecture with skip-like connections.

### FCN

Replacing fully connected layers with convolutional layers.

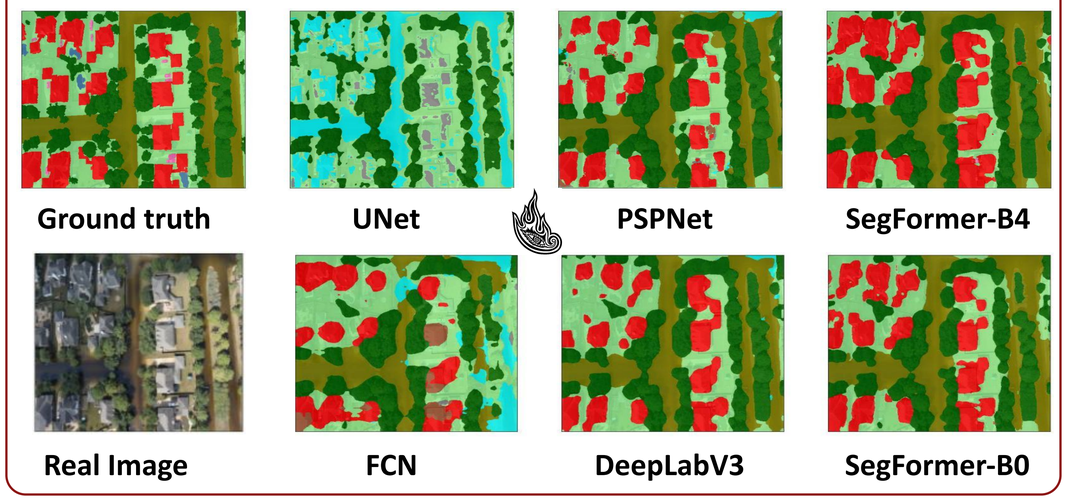
## FloodNet Dataset

- High resolution low altitude images from AUV after hurricane Harvey, capturing post flooded damages in affected areas
- Resize variable size images to 512 x 512, and normalize with ImageNet scaling.

**Challenges**

- Flooded v Non-flooded
- Small Sized Classes
- Natural v Flooded water

## Results




## Summary & Future Work

- Larger models performed better - bigger backbone
- Overlapping patches instead of rescaling
- Additional data augmentation other than jittering