

# Notes - Fully Convolutional Network (FCN)

Wednesday, December 12, 2018 10:32 PM

## What is FCN?

It is a machine learning algorithm used for the computer vision application especially semantic segmentation.

## What is the purpose?

The purpose of FCN is to segment the images and assign pixels belonging to an object to a specific class label.

## What is the advantage of FCN?

When compared to the approaches that were proposed prior to FCN, FCN exceeds the performance of the state of the art algorithm and can be trained end to end.

## What is the common pipeline of previous approaches?

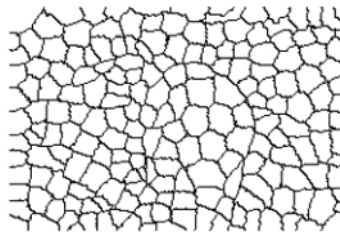
Previous approaches have used pre-processing and post-processing. Pre-processing includes superpixels, proposals and post-processing includes refinement by random-fields or local classifiers.

## What is superpixel? (One of the techniques used by previous approach)

Superpixel is a perceptually meaningful entity that can be obtained from a low-level grouping process. Normalized cuts is a classical region segmentation algorithm which used spectral clustering to exploit pairwise brightness, color and texture affinities between pixels. This algorithm can be applied to oversegment images to obtain superpixels. Following example shows such a superpixel map with the number of clusters 200.



Original Image



Superpixel map with k=200

## How Fully Convolutional network uses the CNN architecture for semantic segmentation?

Deep feature hierarchies created by Convolutional Neural Network encode location and semantics in a nonlinear local-to-global pyramid i.e. the deep layers (feature layers near the end) in the CNN can produce the coarse semantic information and the shallow layers (initial feature layers) provide the fine, appearance related information. These two layers are combined using the skip architecture.

## References:

Fully Convolutional Network

Link: [https://people.eecs.berkeley.edu/~jonlong/long\\_shelhamer\\_fcn.pdf](https://people.eecs.berkeley.edu/~jonlong/long_shelhamer_fcn.pdf)

Superpixel

Link: <http://ttic.uchicago.edu/~xren/research/superpixel/>