파인애플

U-Net, Fusion-Net 논문 리뷰 및 네트워크 구현

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소개

1. 계획

2. U-Net

3. Fusion-Net

계획

6월 : K-mooc 강의 (바이오 메디컬)

7월 : Naver Data Competition 2018

8월 : U-Net, Fusion-Net논문 공부

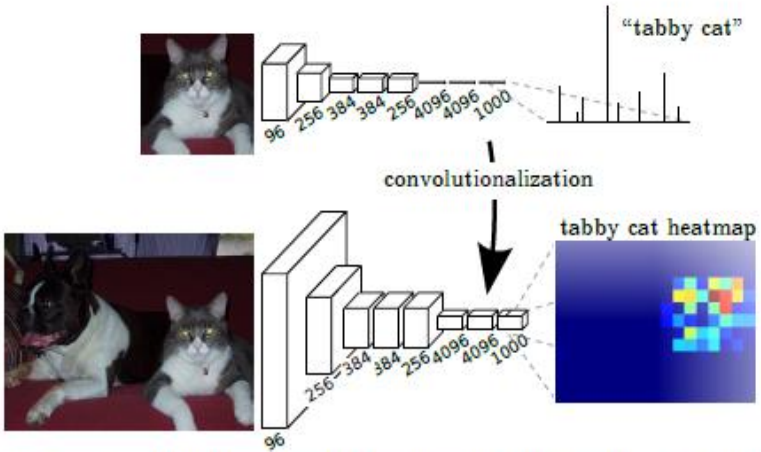


Figure 2. Transforming fully connected layers into convolution layers enables a classification net to output a heatmap. Adding layers and a spatial loss (as in Figure 1) produces an efficient machine for end-to-end dense learning.

* FCL를 거치면 위치,공간에 대한 정보가 모두 사라지는 문제가 발생

* FCN는 픽셀 단위의 조밀한 예측을 한다. 즉, 공간, 위치에 대한 정보를 가진다.

Fully Convolutional Networks for Semantic Segmentation, UC Berkeley

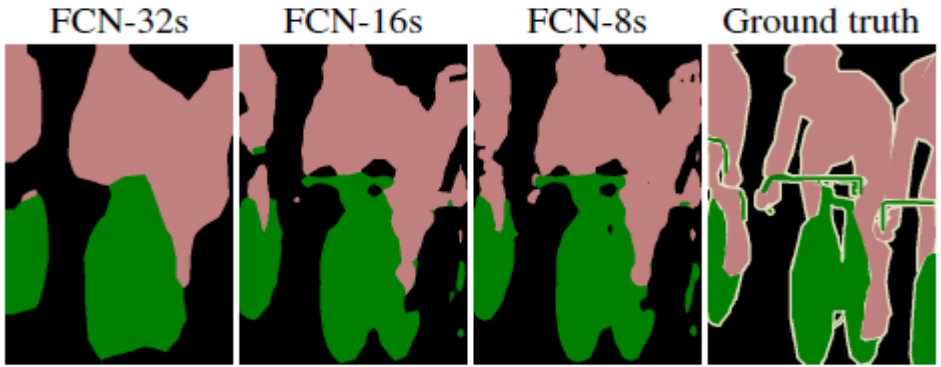
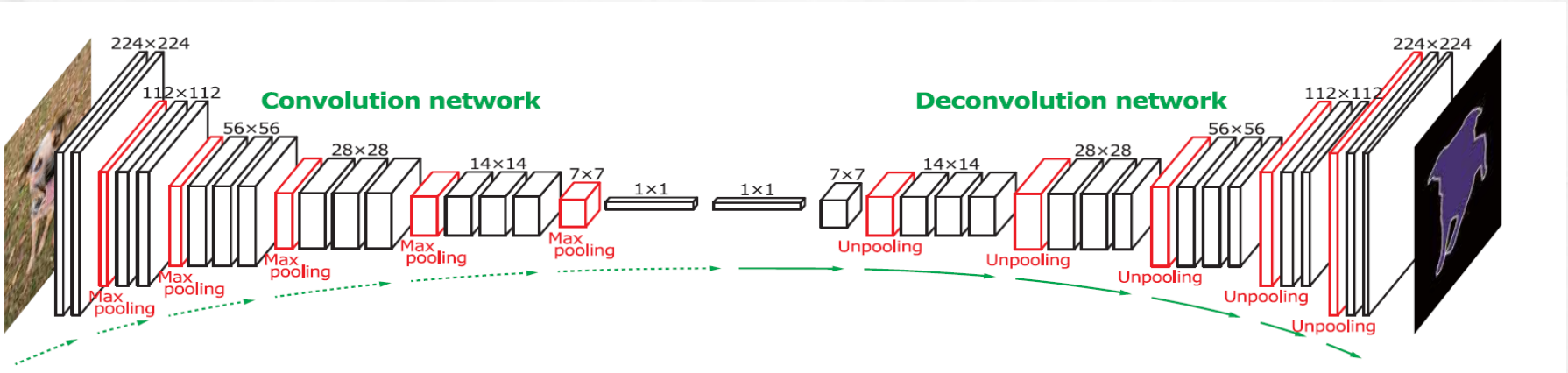


Figure 4. Refining fully convolutional nets by fusing information from layers with different strides improves segmentation detail. The first three images show the output from our 32, 16, and 8 pixel stride nets (see Figure 3).

- FCN-32s보다는 FCN-16s가 FCN-16s보다는 FCN-8s가 더 detail한 segmentation결과를 보여주고 있다.
- 하지만 아직 detail이 좋지 않다는 단점이 있다.
- 아래 네트워크는 FCN의 detail 문제를 개선한 논문에 나온 구조이다.



Learning Deconvolution Network for Semantic Segmentation , POSTECH

U-Net

- Sliding-window have two drawback

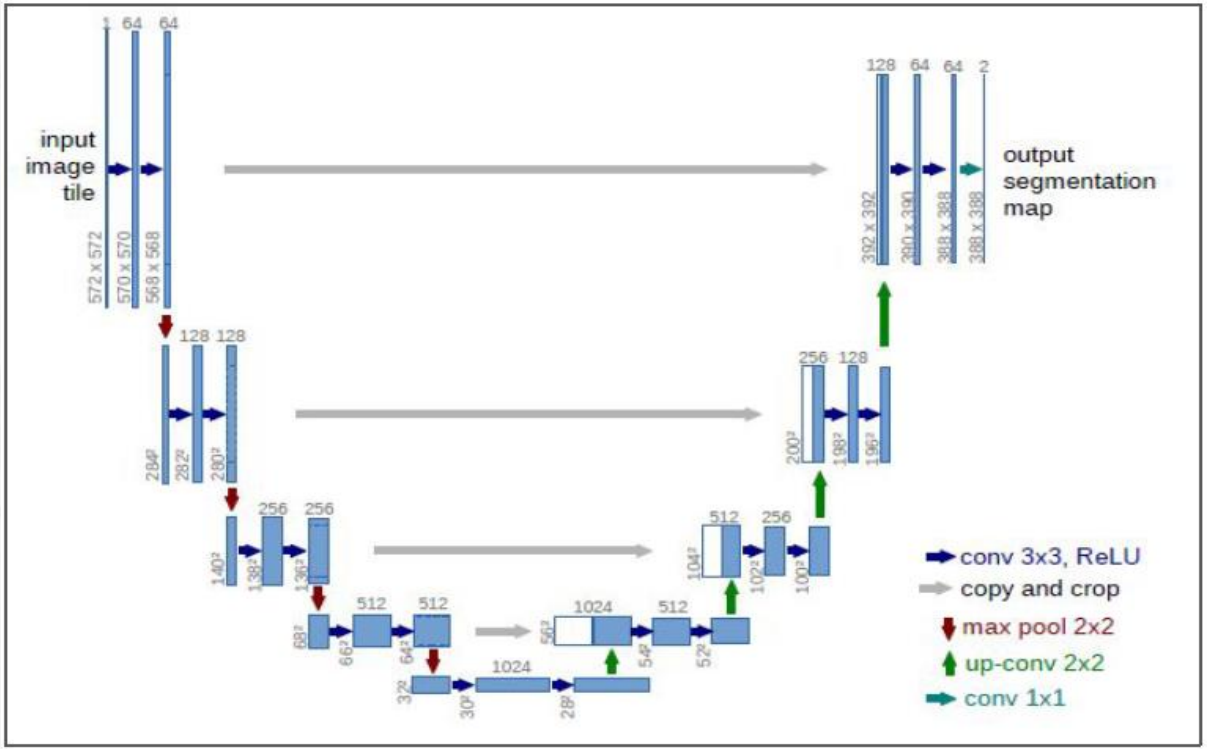
- 1. That is quite slow, because the network must be run separately for each patch, and there is a lot of redundancy due to overlapping patches.

- 2. U-Net Convolutional Networks for Biomedical Image Segmentation quotes, Larger patches require more max-pooling layers that reduce the localization accuracy, while small patches allow the network to see only little context.

U-Net

- One of the model of Convolution Neural Net, the best of best performs to predicts in between a number of CNN-Model.

- Network processing be similar to the figure.



Network Architecture

It consists of a contracting path (left side) and an expansive path (right side)

* contracting path

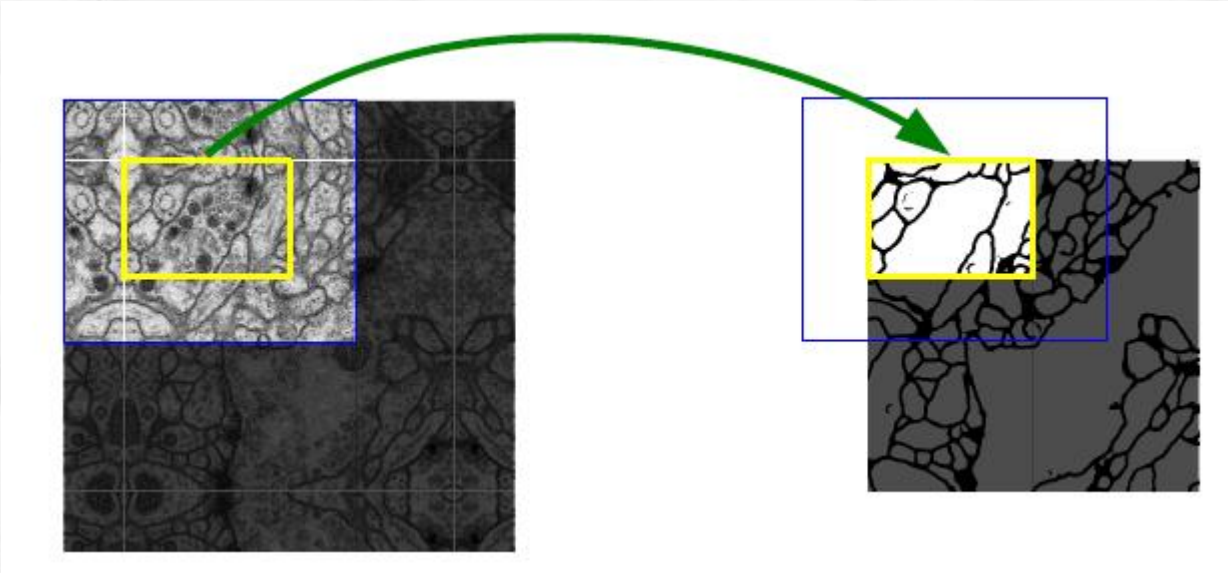
- 전형적인 Convolution network
- 두번의 3X3 convolution을 반복 수행
- ReLU
- downsampling과정에서 2x2 max pooling operation , stride 2
- downsampling시에는 2배의 feture channel을 사용

* Expanding Path

- 2X2 up-convolution을 사용
- feature channel은 반으로 줄여 사용
- Contracting Path에서 Max-Pooling 되기 전의 feature map을 Crop 하여 Up-Convolution 할 때 concatenation
- 3X3 convolution
- ReLU

U-Net

To predict the pixels in the border region of the image, the missing context is extrapolated by mirroring the input image



U-Net

1. The main idea in is to supplement a usual contracting network by successive layers, where pooling operators are replaced by up-sampling operators

2. Expanding Path과정에서 Up-sampling 할 때, 더 정확한 Localization을위해서 Contracting Path의 Feature를 Copy and Crop하여 Concat 하는 구조.

3. Data Augmentation

네트워크 구현 : https://github.com/oryondark/-/blob/master/UNet_tutorial/UNet_tutorial.ipynb

Fusion-Net

- What is one drawback of U-Net..?

  Problems occur when networks are deeply stacked

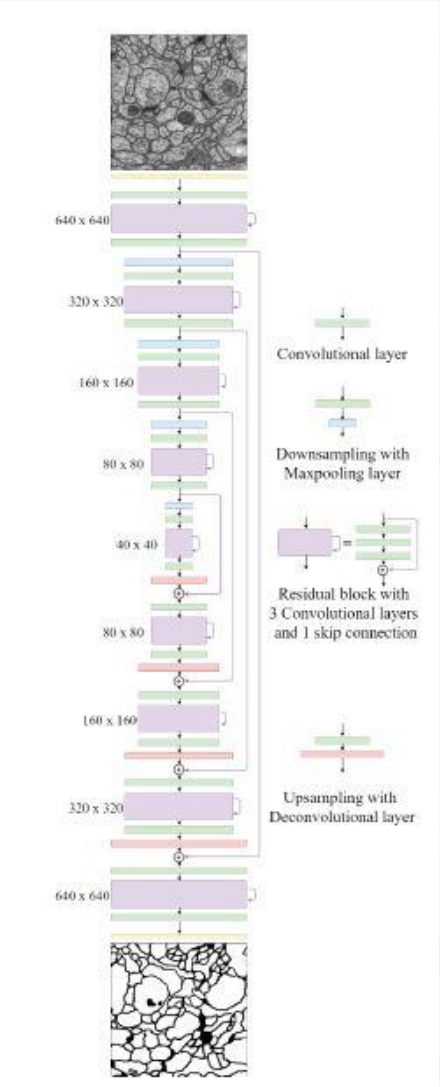
  > gradient vanishing

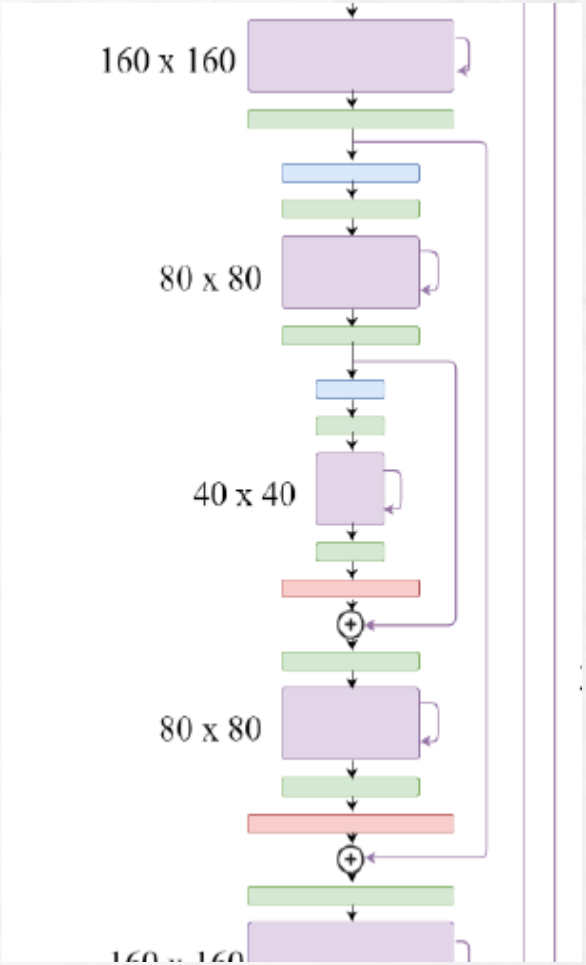
- How to solve this problem?

Fusion-Net

- How to solve this problem?

  by using residual layers





Fusion-Net

- What a different of the Fusion-Net and U-net..?

  - long skip-connection

  - short skip connection at the each residual block

long skip connection. By replacing a concatenation with an addition, our network becomes a *fully* residual network and some issues in deep network (i.e., gradient vanishing) can be handled effectively. In addition, our network has nested short and long skip connections that help information flow within and across levels in the network.

네트워크 구현 : https://github.com/Jeongseungwoo/Fusion-net/blob/master/FusionNet.py

THANK YOU FOR YOUR TIME

감 사 합 니 다