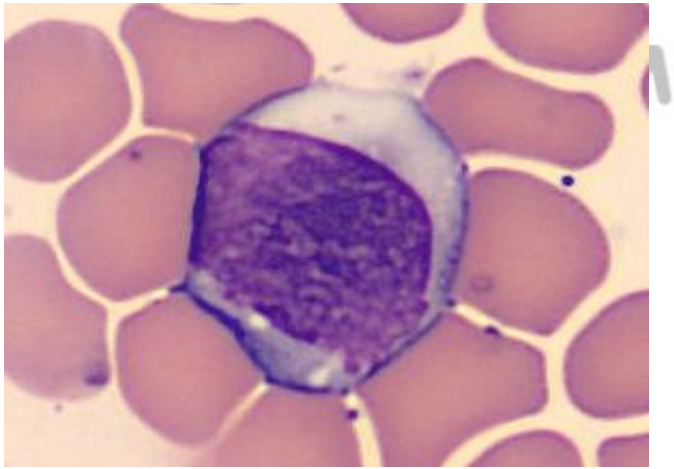
Understanding DL Architectures for Image Segmentation

Analytics Vidhya

What we will be covering in this module?

- Introduction is Image Segmentation
- How to solve Image Segmentation problems?
- Approaches for Image Segmentation
  - Use Traditional Methods
  - Leverage Deep Learning
- Understanding Deep Learning Architectures for Image Segmentation
- Project on Lane Segmentation for Self Driving Cars
- What's Next?

Approach to solve Blood Cell Segmentation



Advanced
Deep Learning

Understanding DL Architectures for Image Segmentation

- U-Net Family
- DeepLab Family
- R-CNN Family

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Key Takeaways of U-Net Family

- Encoder-Decoder Network with skip connections

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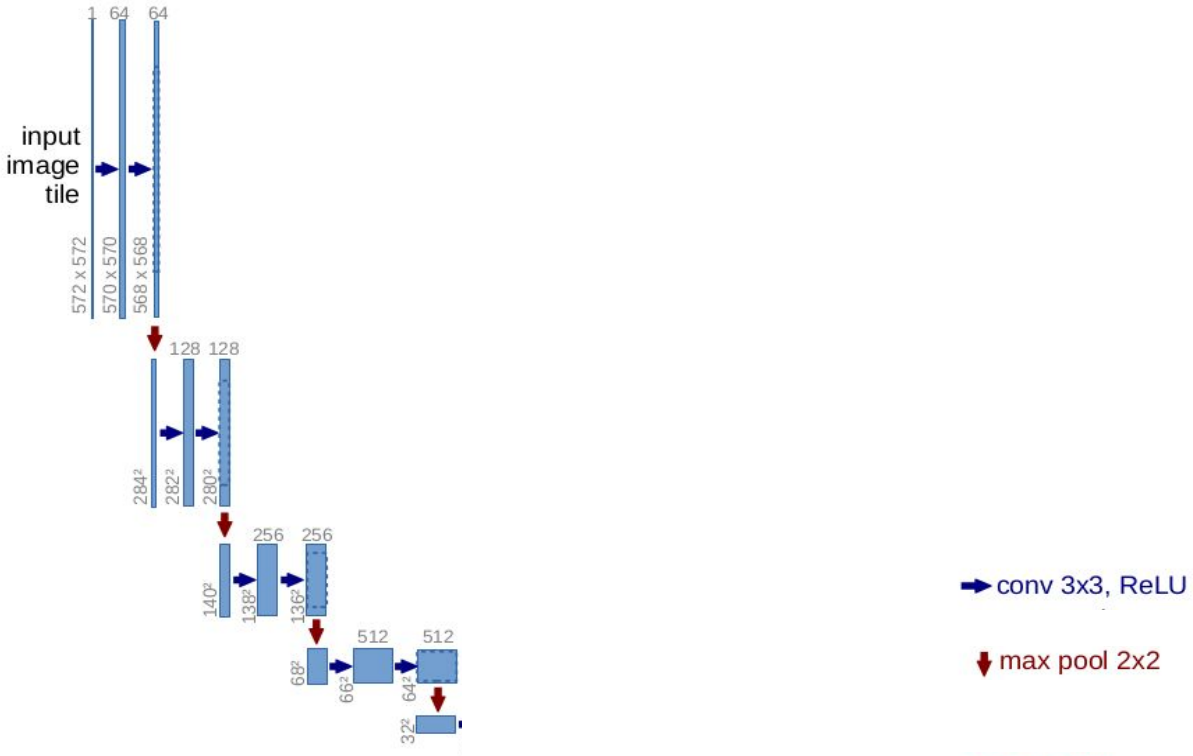

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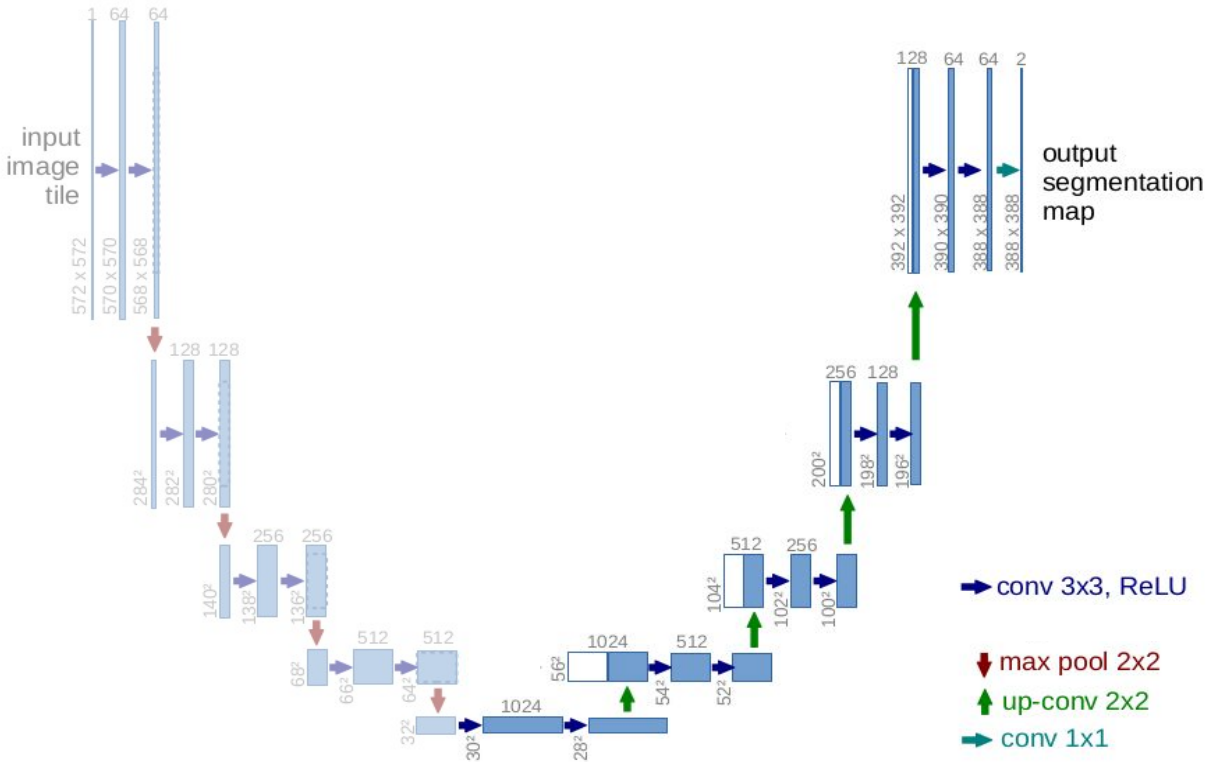

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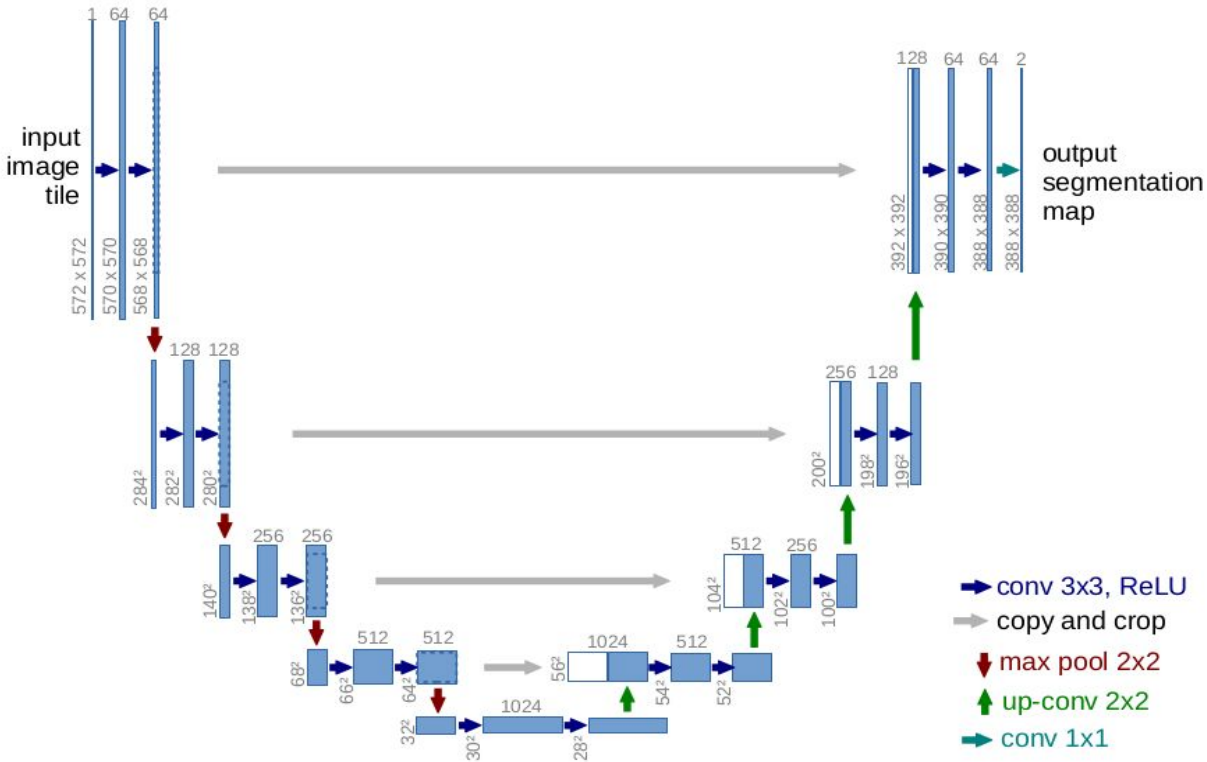

- Encoder-Decoder Network with skip connections

Source: Ronneberger O., Fischer P., Brox T. (2015) U-Net: Convolutional Networks for Biomedical Image Segmentation.

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Key Takeaways of U-Net Family

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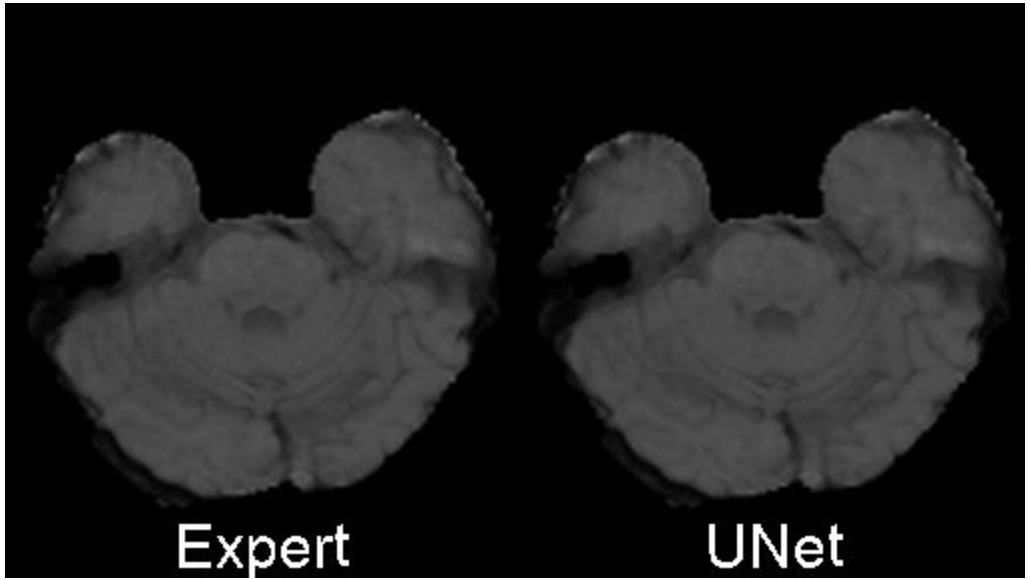

Source: https://github.com/ellisdg/3DUnetCNN

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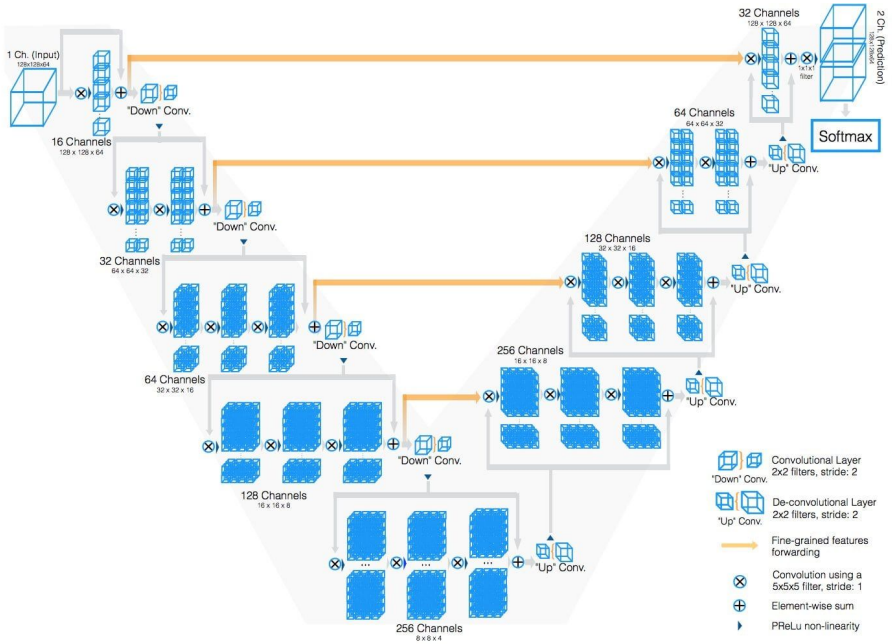

Source: Fausto Milletari et. al. (2016) V-Net: Fully Convolutional Neural Networks for Volumetric Medical Image Segmentation

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Steps for Image Segmentation using U-Net model

1. Data Loading and Preprocessing

1.1 Load the Data

1.2 Define custom dataset and dataloader

1.3 Data Exploration

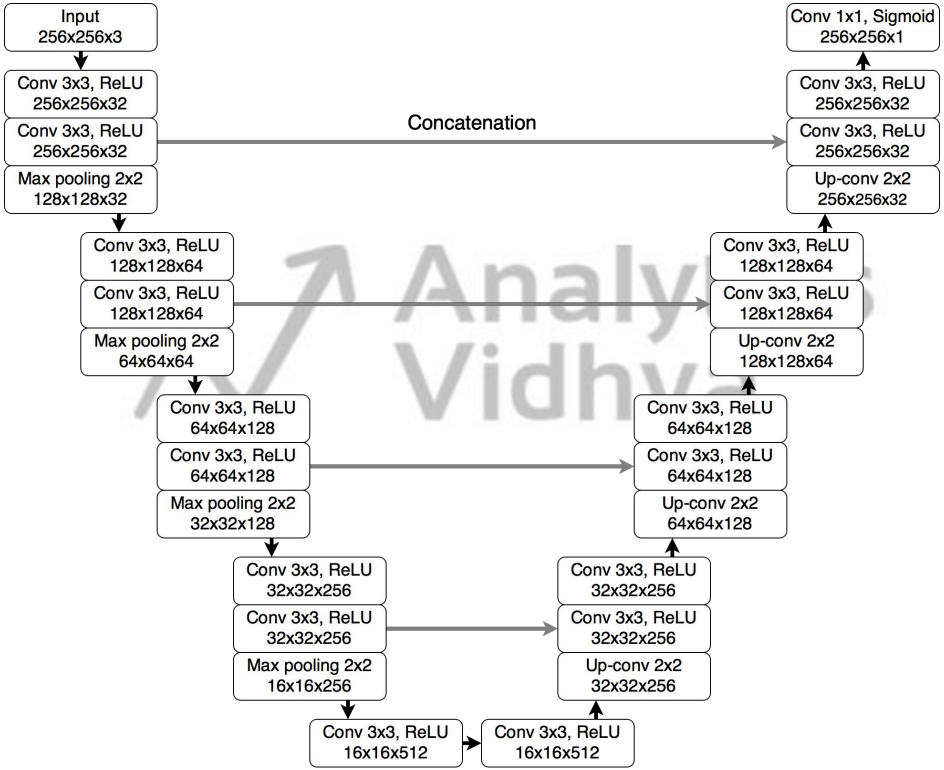
2. Image Segmentation through U-Net model

2.1 Define model architecture

2.2 Train the model

2.3 Calculate IoU score

Steps for Image Segmentation using U-Net model



Source: Mateusz Buda et. al. (2019) "Association of genomic subtypes of lower-grade gliomas with shape features automatically extracted by a deep learning algorithm"

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Code Walkthrough of U-Net

Thank you