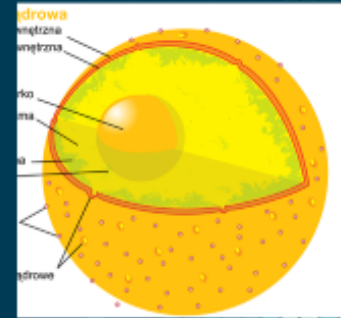


Project Progress

FIND THE NUCLEI IN DIVERGENT IMAGES TO ADVANCE MEDICAL DISCOVERY

SRUJANI ELANGO



INTRODUCTION

- Idea is to spot nuclei in cells to speed up curing
- Create an algorithm to automate nucleus detection.
- Detection of nucleus is the first stage for most analyses
- Identifying nuclei allows researchers to identify each individual cell in a sample

STEPS IN MEDICAL DIAGNOSIS

- Locate cells in varied conditions
- Develop drugs
- Improve health and quality of life

3

DATASET SPLIT

TRAIN

29,460 IMAGES & MASKS

TEST

STAGE 1 -700 IMAGES
STAGE 2 – YET TO BE
RELEASED

4



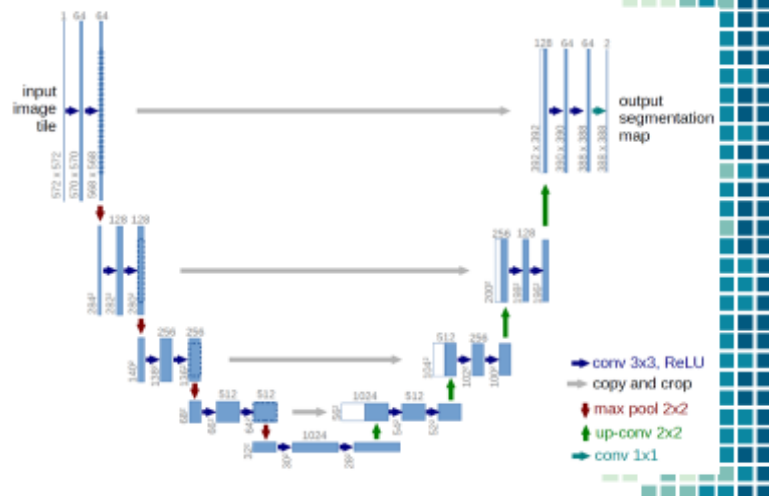
PROPOSED MODELS

- U-NET CNN
- MASK RCNN
- RESNET

5

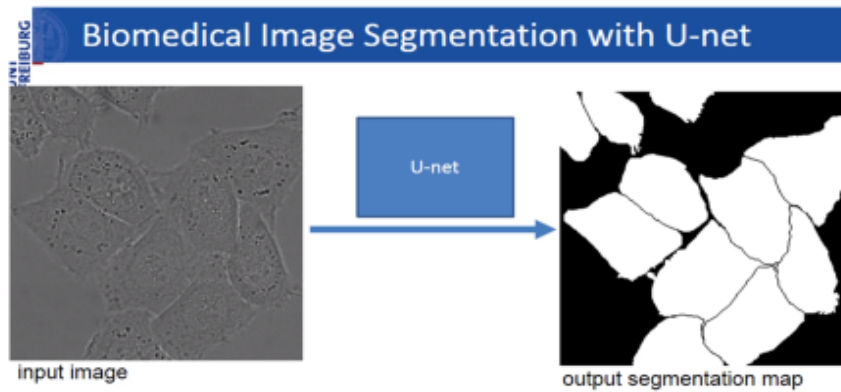
U-NET: CNN (ARCHITECTURE)

The u-net is a convolutional network architecture for fast and precise segmentation of images.



6

U-NET: INPUT AND OUTPUT

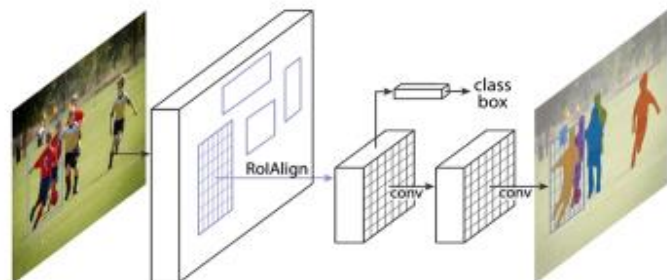


7

MASK R-CNN ARCHITECTURE

R-CNN is a state-of-the-art visual object detection system that combines bottom-up region proposals with rich features computed by a convolutional neural network.

Mask R-CNN → Faster R-CNN + FCN



8

RESNET ARCHITECTURE

Deep Residual Network was arguably the most groundbreaking work in the computer vision/deep learning community in the last few years. ResNet makes it possible to train up to hundreds or even thousands of layers and still achieves compelling performance

Resnet

- **Very deep using skip connection**
 - Now, v2 - 1001 layer architecture
- **Now, Resnet-152 v2 is the de-facto standard**

layer name	input size	10 layers	50 layers	101 layers	152 layers	152 layers
conv1	224 x 224					
conv2_x	112 x 112	3x3, 64, s2	3x3, 64, s2	3x3, 64, s2	3x3, 64, s2	3x3, 64, s2
conv3_x	56 x 56	3x3, 128, s2	3x3, 128, s2	3x3, 128, s2	3x3, 128, s2	3x3, 128, s2
conv4_x	28 x 28	3x3, 256, s2	3x3, 256, s2	3x3, 256, s2	3x3, 256, s2	3x3, 256, s2
conv5_x	14 x 14	3x3, 512, s2	3x3, 512, s2	3x3, 512, s2	3x3, 512, s2	3x3, 512, s2
conv6_x	7 x 7	3x3, 512, s2	3x3, 512, s2	3x3, 512, s2	3x3, 512, s2	3x3, 512, s2
avgpool	1 x 1					
fc1000						

9

Progress

- Researched and studied about different architectures for image segmentation
- Analyzed dataset and used Exploratory data analysis to get a detailed introduction about the dataset
- Started with UNet code and achieved an accuracy of 0.30 with stage1_train dataset

Improvements from Kaggle – Future scope

- Modifying the architecture of UNet: CNN. Including more contraction and expansion layers according to what the input dataset
- Implementing modified Mask: RCNN by changing parameters and number of layers
- Implementing Resnet architecture for image segmentation