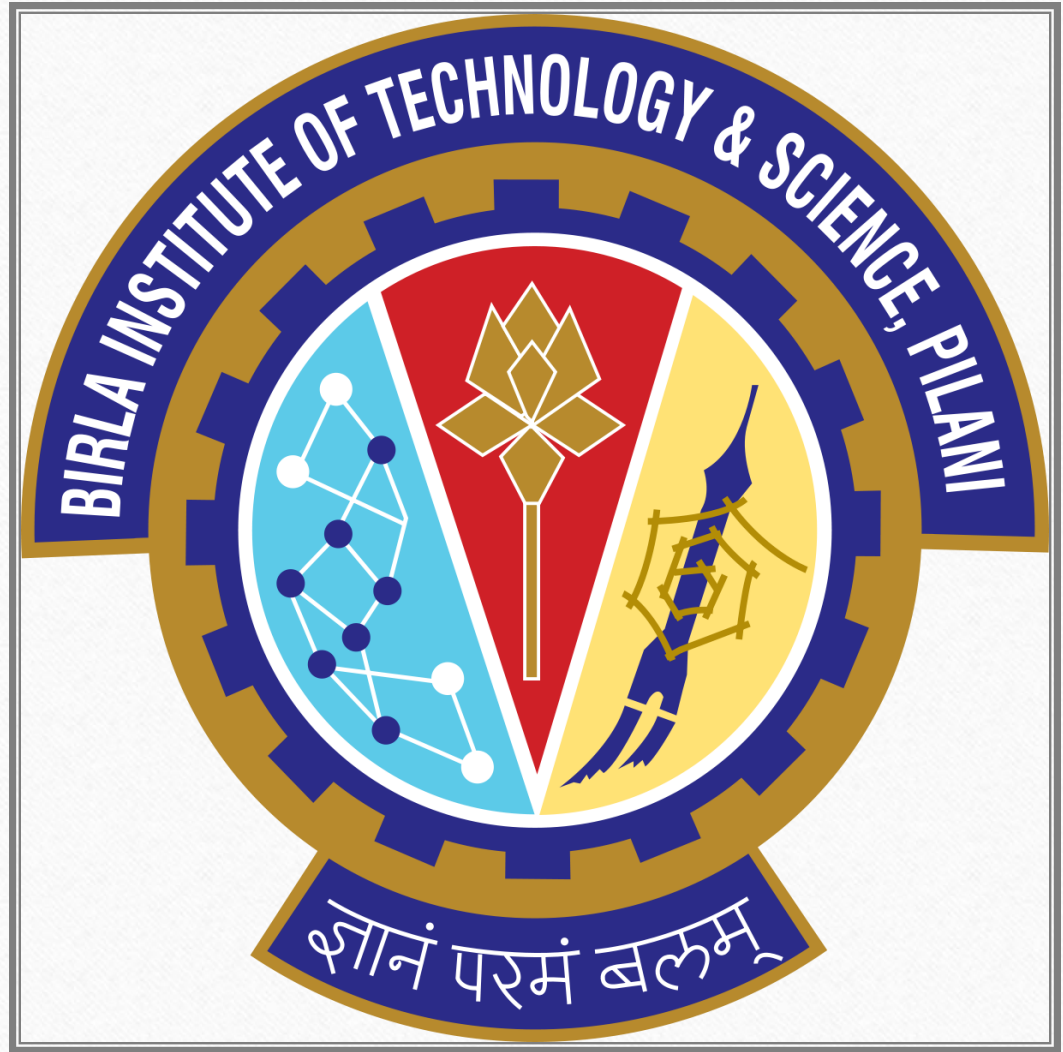


NNFL Group project



Course Instructors

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- Prof. Surekha Bhanot

Assigned TA -

- Honnesh Rohmetra

Group Members –

- Sanjeev Singla I.D. - 2017A8PS0152P
- Swastik Mohanty I.D. - 2017A8PS0282P

Paper I.D. -

- 71

CATEGORIES

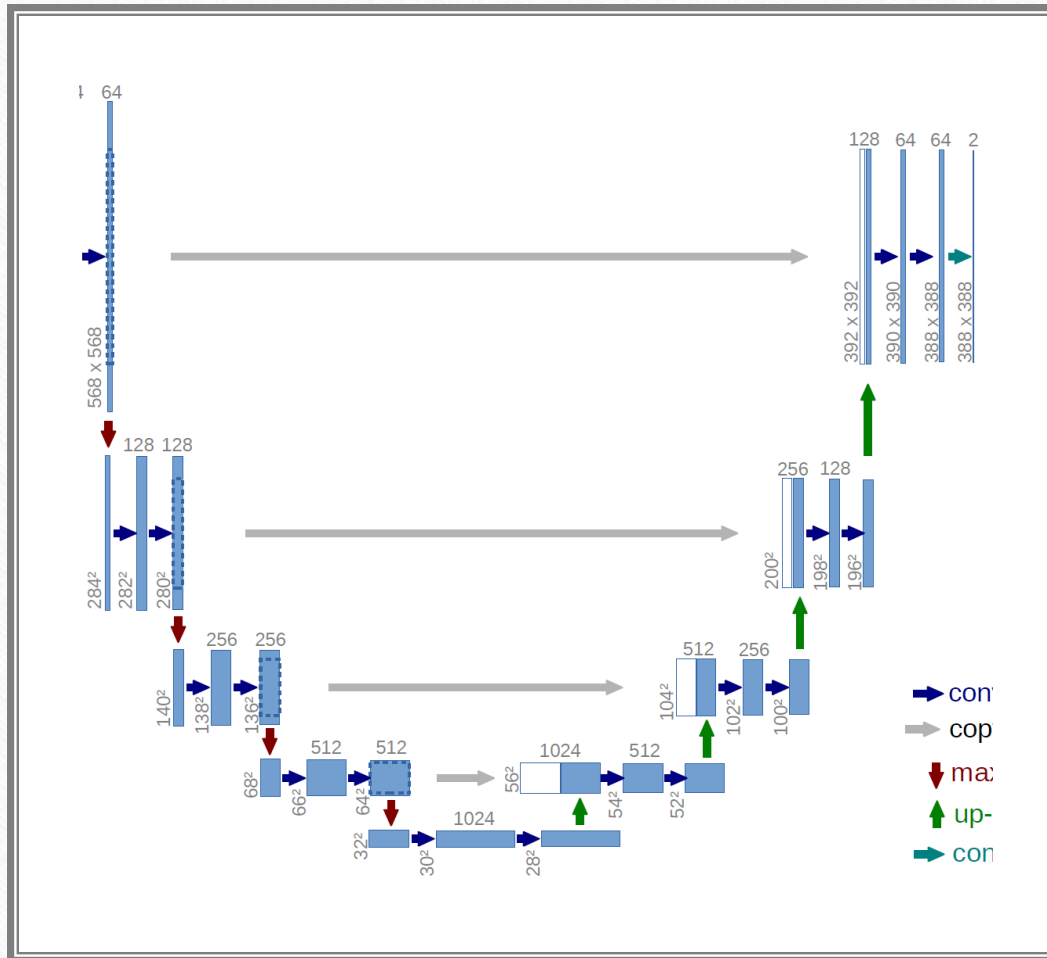
- CNN
- Semantic Segmentation
- Encoder-Decoder

U-Net: Convolutional Networks for Biomedical Image Segmentation

U-Net Model

- U-Net is a convolutional neural network that was developed for biomedical image segmentation. It consists of a contracting path and an expansive path, which gives it the u-shaped architecture.
- Contraction path consists of a repeated application of a 3x3 convolutions(unpadded) each followed by a ReLU and a 2x2 max pooling operation with stride 2 for downsampling. At each downsampling step, we double the number of feature channels. This captures context via a compact feature map.
- The expansion path consists of upsampling of the feature map followed by a 2x2 convolution(“up-convolution”) that halves the number of feature channels a concatenation with the cropped feature map from the contracting path, and a 3x3 convolutions, followed by a ReLU. The upsampling of the feature dimension is done to meet the same size as the block to be concatenated on the left.

Network Architecture



Data

- The photographs for the DRIVE database were obtained from a diabetic retinopathy screening program in The Netherlands. The screening population consisted of 400 diabetic subjects between 25-90 years of age. Forty photographs have been randomly selected, 33 do not show any sign of diabetic retinopathy and 7 show signs of mild early diabetic retinopathy.
- Each image has been JPEG compressed. The images were acquired using a Canon CR5 non-mydratic 3CCD camera with a 45-degree field of view (FOV). Each image was captured using 8 bits per color plane at 768 by 584 pixels. The FOV of each image is circular with a diameter of approximately 540 pixels. For this database, the images have been cropped around the FOV. For each image, a mask image is provided that delineates the FOV.

Pre – Processing



GRAY-SCALE
CONVERSION



STANDARDIZATION



CONTRAST-LIMITED
ADAPTIVE HISTOGRAM
EQUALIZATION (CLAHE)



GAMMA ADJUSTMENT

Results



ACCURACY: 0.955983978469



RECALL: 0.767137136912



SPECIFICITY:
0.98352781244



PRECISION:
0.871673216962

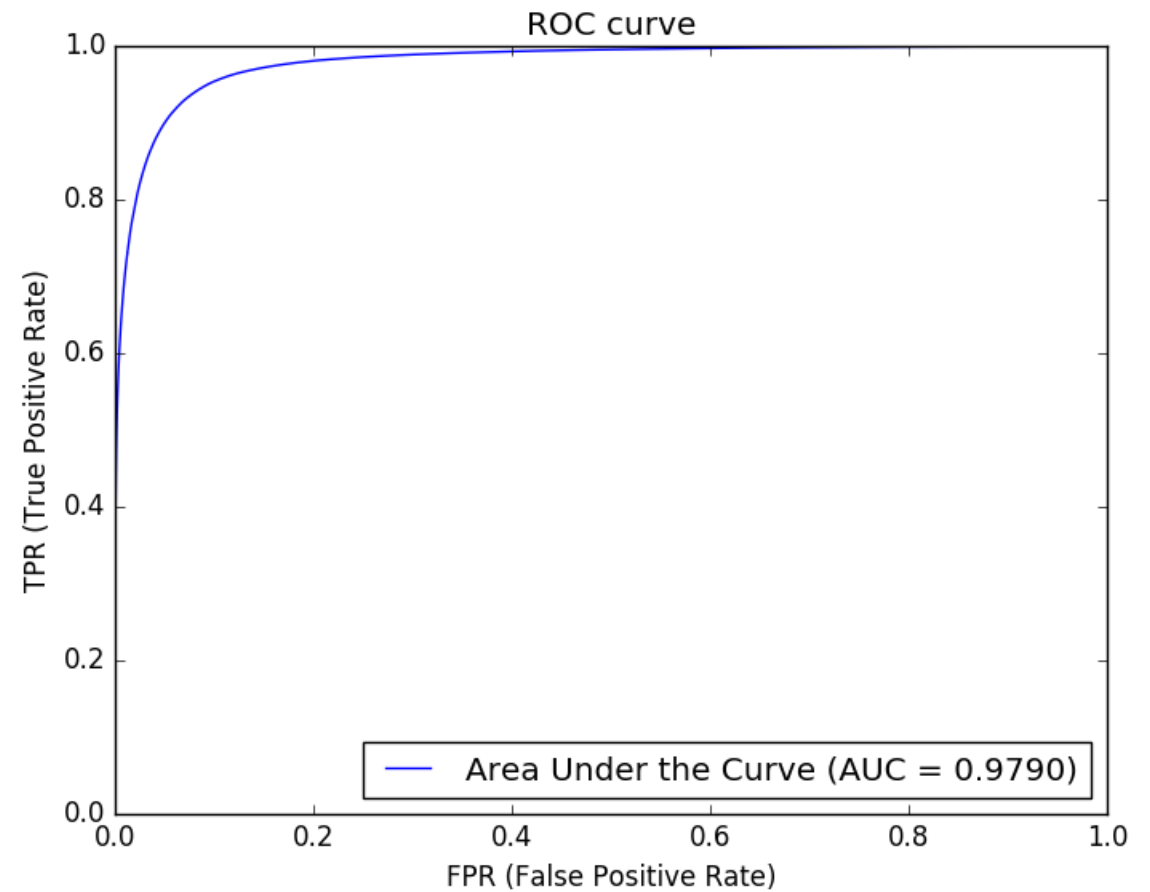


F1 SCORE: 0.816071114516

$$\begin{aligned} \text{precision} &= \frac{TP}{TP + FP} \\ \text{recall} &= \frac{TP}{TP + FN} \\ F1 &= \frac{2 \times \text{precision} \times \text{recall}}{\text{precision} + \text{recall}} \\ \text{accuracy} &= \frac{TP + TN}{TP + FN + TN + FP} \\ \text{specificity} &= \frac{TN}{TN + FP} \end{aligned}$$

	p' (Predicted)	n' (Predicted)
p (Actual)	True Positive	False Negative
n (Actual)	False Positive	True Negative

ROC Curve





Thank You
