Gland Segmentation Using the Convolution Neural Network

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1 Methods

Step 1: Construction of three databases (Benign, Malignant, Background) using 85 color images and corresponding binary annotation images;

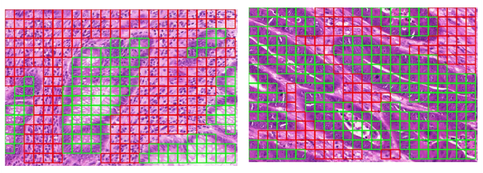
Step 2: Train AlexNet for 30 epochs;

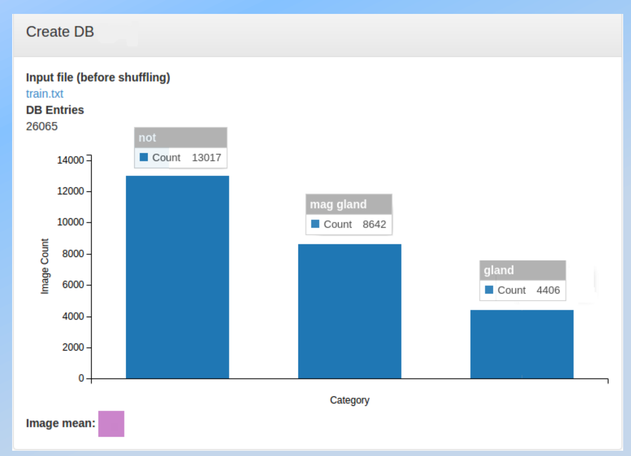
Step 3: Initial segmentation of pathological color images by trained AlexNet,and colored the pixels red, blue or green indicates which class these pixels belong to;

Step 4: Postprocessing the Initial segmentation results by simple erosion, dilatation operators and connected component analysis to get the final segmentation

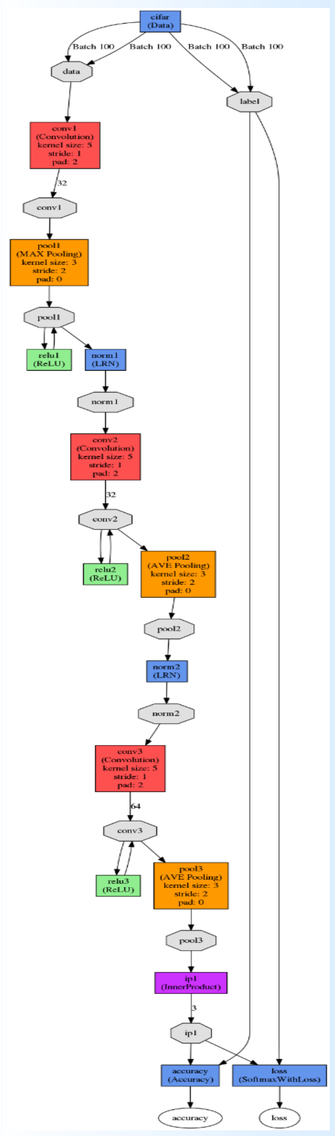
2 Construction of database

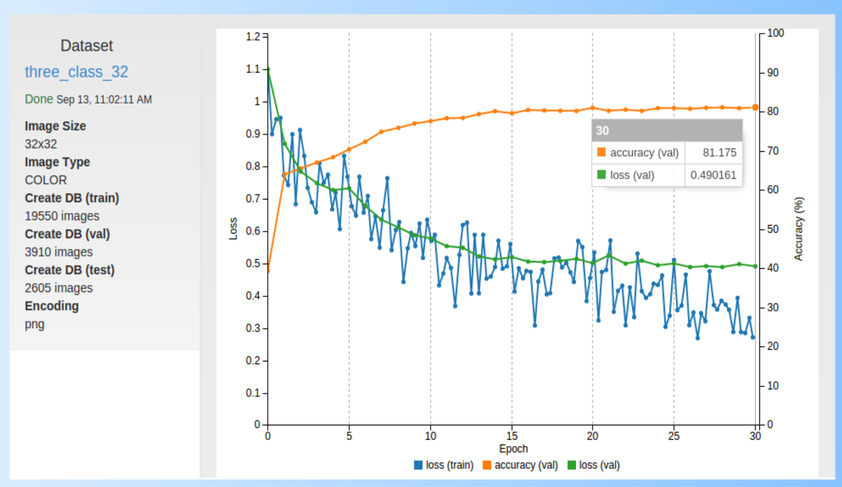
- *Get samples*
  - Use a block of 32*32*3 to slide the area with non-overlapping
  - Divide all the sub-images into three classes (benign, malignant, background) according to the annotation





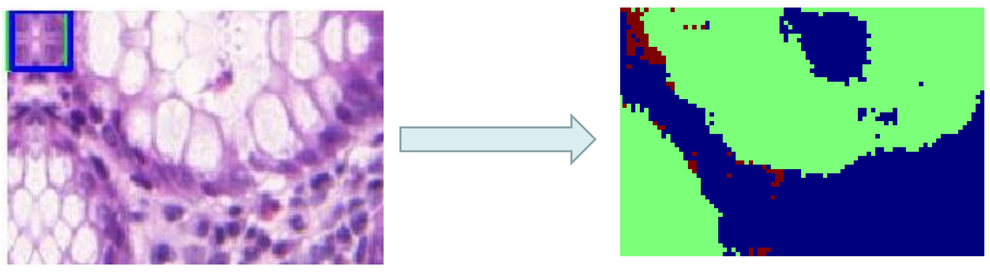
3 Training AlexNet

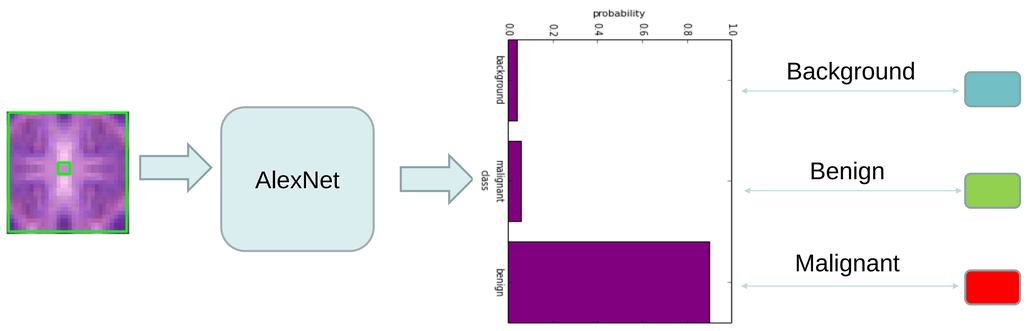




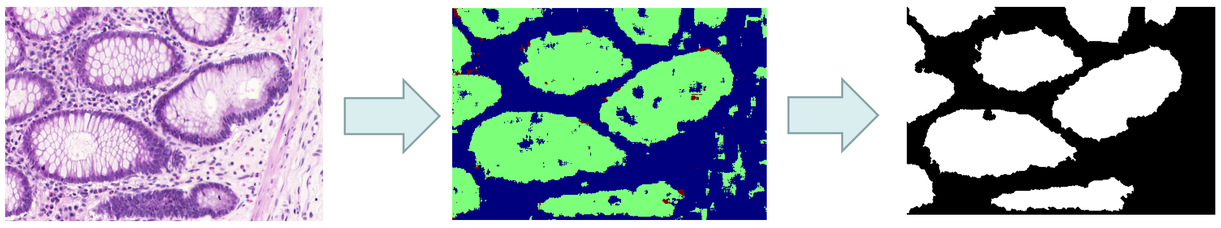
4 Segmentation Experiments

- *Classification based on pixels*





- *Post-processing*



- Use the dilatation operation(set the size 5) to connect the closed pixels
- Use connected component analysis to remove the isolated points
- Mark small blue region as gland
- Use erosion operation to keep the shape

5 Conclusion

- *Result of training dataset*

	F1-Score	Obj-Dice	Hausdorff
Scores	0.5934	0.5995	122.6693
Valid score numbers	83	85	85

- Easy method combined with the convolution neural networking can be used for gland segmentation
- Using CNN not only segment the gland tissue, but also classify the benign or malignant gland, thus it can be used for automatic grading cancer

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