Team John Hall

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CNN Structure

	Layers				
	1	2	3	4	5
Type	Conv + Pool(max)	Conv + Pool(max)	Conv + Pool(max)	Fully Connected	Fully Connected
Channels	32	32	64	64	2
Filter Size	5 x 5	5 x 5	5 x 5	-	-
Convolution Stride	1 x 1	1 x 1	1 x 1	-	-
Pooling Size	3 x 3	3 x 3	3 x 3	-	-
Pooling Stride	2 x 2	2 x 2	2 x 2	-	-
Padding Size	2 x 2	2 x 2	2 x 2	-	-

Training

The following settings / parameters were used during training:
Fix learning rate: 0.0001
Dropout probability: 0.7
Training batch size: 128
Optimizer: Adam Optimizer
Loss Function: Cross Entropy
Number of patches generated from each image: 100
Patch size: 64

Data Manipulation:

Image is thumbnailed to half the size, because we found that this improves the quality of the image. Besides that, we also subtract the mean of the image RGB value from the image.

We wanted to introduce some noise during training so the network will become more resilient during operation. Below are some of the methods of doing that:

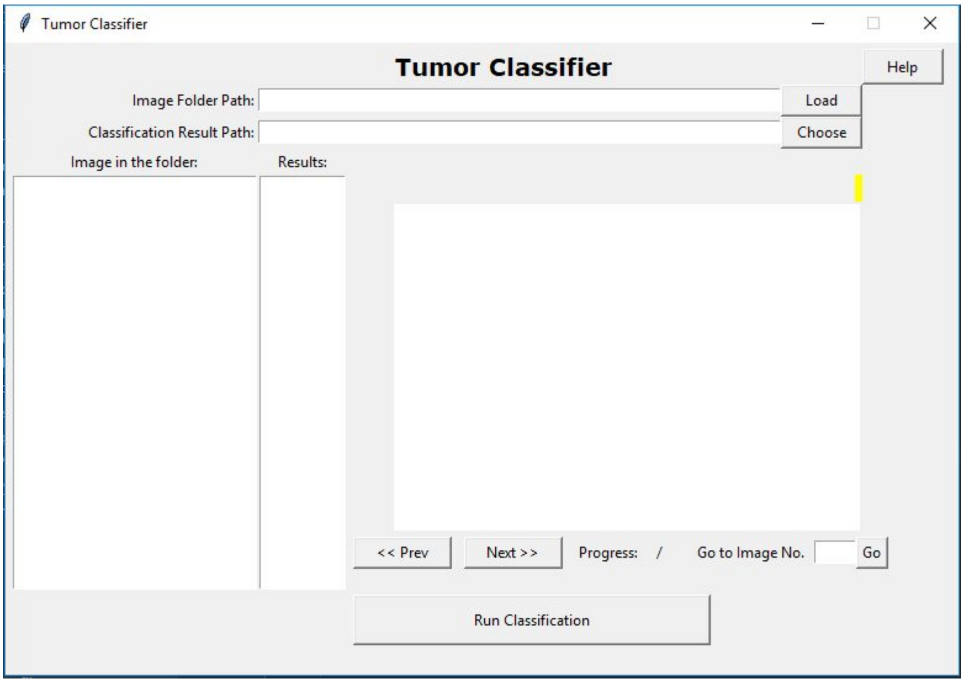
1. Rotate image
   Image rotate probability:

Original:	0.4
90 degrees:	0.2
180 degrees:	0.2
270 degrees:	0.2

2. Image is mirrored with a probability of 0.5

GUI

The GUI is made using Tkinter. It takes in a folder path that contains all the images that need to be classified and output path for the classification result.



Once the files are loaded, click Run Classification to classify all images. And the classification result will be shown.

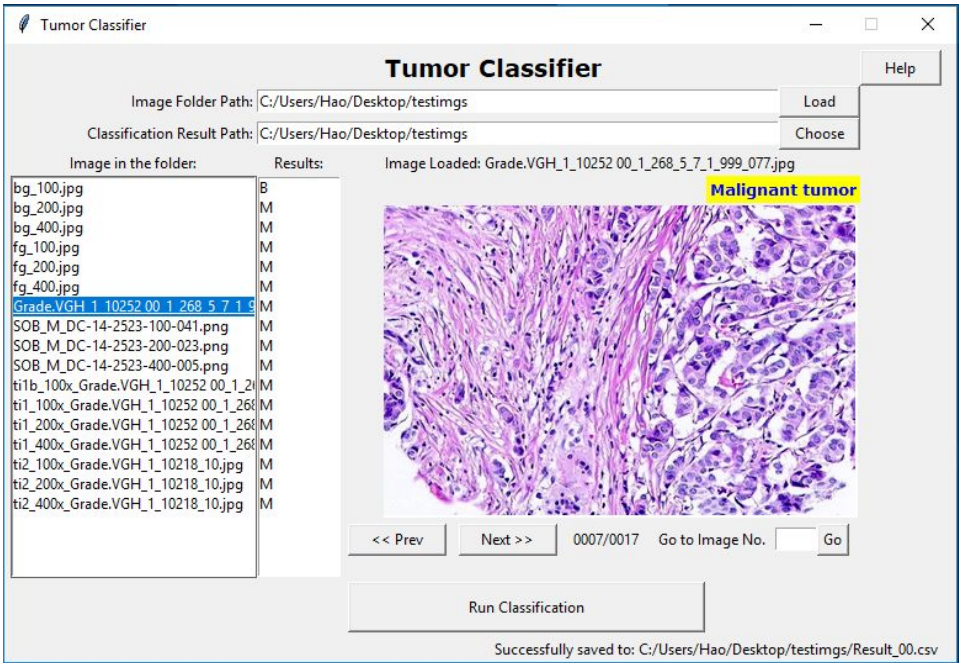


Image Folder Path: C:/Users/Hao/Desktop/testimgs

Classification Result Path: C:/Users/Hao/Desktop/testimgs

Image Loaded: Grade.VGH_1_10252 00_1_268_5_7_1_999_077.jpg

Malignant tumor

Image in the folder:	Results:
bg_100.jpg	B
bg_200.jpg	M
bg_400.jpg	M
fg_100.jpg	M
fg_200.jpg	M
fg_400.jpg	M
Grade.VGH_1_10252 00_1_268_5_7_1_9	M
SOB_M_DC-14-2523-100-041.png	M
SOB_M_DC-14-2523-200-023.png	M
SOB_M_DC-14-2523-400-005.png	M
ti1b_100x_Grade.VGH_1_10252 00_1_2	M
ti1_100x_Grade.VGH_1_10252 00_1_26	M
ti1_200x_Grade.VGH_1_10252 00_1_26	M
ti1_400x_Grade.VGH_1_10252 00_1_26	M
ti2_100x_Grade.VGH_1_10218_10.jpg	M
ti2_200x_Grade.VGH_1_10218_10.jpg	M
ti2_400x_Grade.VGH_1_10218_10.jpg	M

0007/0017

Successfully saved to: C:/Users/Hao/Desktop/testimgs/Result_00.csv

Achieved Accuracy

We chose 100X images during training, validating and testing and achieved the following accuracy:

split	Validation accuracy	Test accuracy
1	80.95%	88.20%
2	68.46%	86.28%
3	63.74%	83.16%
4	80.47%	77.64%
5	93.90%	79.47%
	Average	82.95%