Breast Cancer Metastases Detection

Team: GoldenPass

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**Highlights**

* 1st Use the convolutional networks : Simple Net (8-layer), IncpetionV3 + Unet
* 2nd Use only 100% tumor patch for training (every pixels are tumor)
* 3rd Carefully Sampling (1 : 1 : 2 = positive tumor patches : positive non-tumor patches : negative patches

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| Fig. 1 |

**Methods**

1. Perprocessing

* Find Tissue Patch
  + Eliminate black Area
  + Then, using ostu method
  + We only use 100 % tumor patches for training because truth lv4 slide cannot be completely match lv0, boundary side.
  + Using slide.properties instead of min-offset.
* Sampling
  + 1 : 1 = positive slide patches : negative slide patches
  + 1 : 1 : 2 = positive tumor patches : positive non-tumor patches : negative patches

1. Deep learning framework

Simple Network

* 1. Architecture- Simple net
     1. Input size 256 x 256 x 3
     2. Number of layers : 9
     3. Augmentation : rotation range (0, 90), horizontal flip, vertical flip, brightness range (0.3,1)
  2. Parameters
     1. Optimization method : Adam
     2. Weight initialization : None
     3. Batch size : 128
     4. Batch normalization : non
     5. Regularization : non
     6. Learning rate : 0.001 -> 0.0005
     7. Activation function :elu
     8. Loss function : categorical\_crossentropy
     9. Number of training epochs/iterations : 20 (20000 samples)
     10. Number of training Parameters : about 1,538,048

InceptionV3 + unet

1. Architecture- Simple net
   * 1. Input size 256 x 256 x 3
     2. Augmentation : rotation range (0, 45), horizontal flip, vertical flip, brightness range (0.5,1)
2. Parameters
   * 1. Optimization method : Adam
     2. Weight initialization : Yes
     3. Batch size : 64
     4. Batch normalization : Yes
     5. Regularization : Yes
     6. Learning rate : 0.001
     7. Activation function : ReLU
     8. Loss function : categorical\_crossentropy
     9. Number of training epochs/iterations : 15 ( 10000 samples)
     10. Number of training Parameters : about 2,000,000
3. Postprocessing or ensemble : ensemble those two Network
4. Inference : pick max prediction value in center of patch (128 x 128), and obtain max prediction among them. (5000 samples each slide)