

Cancer Metastases Detection

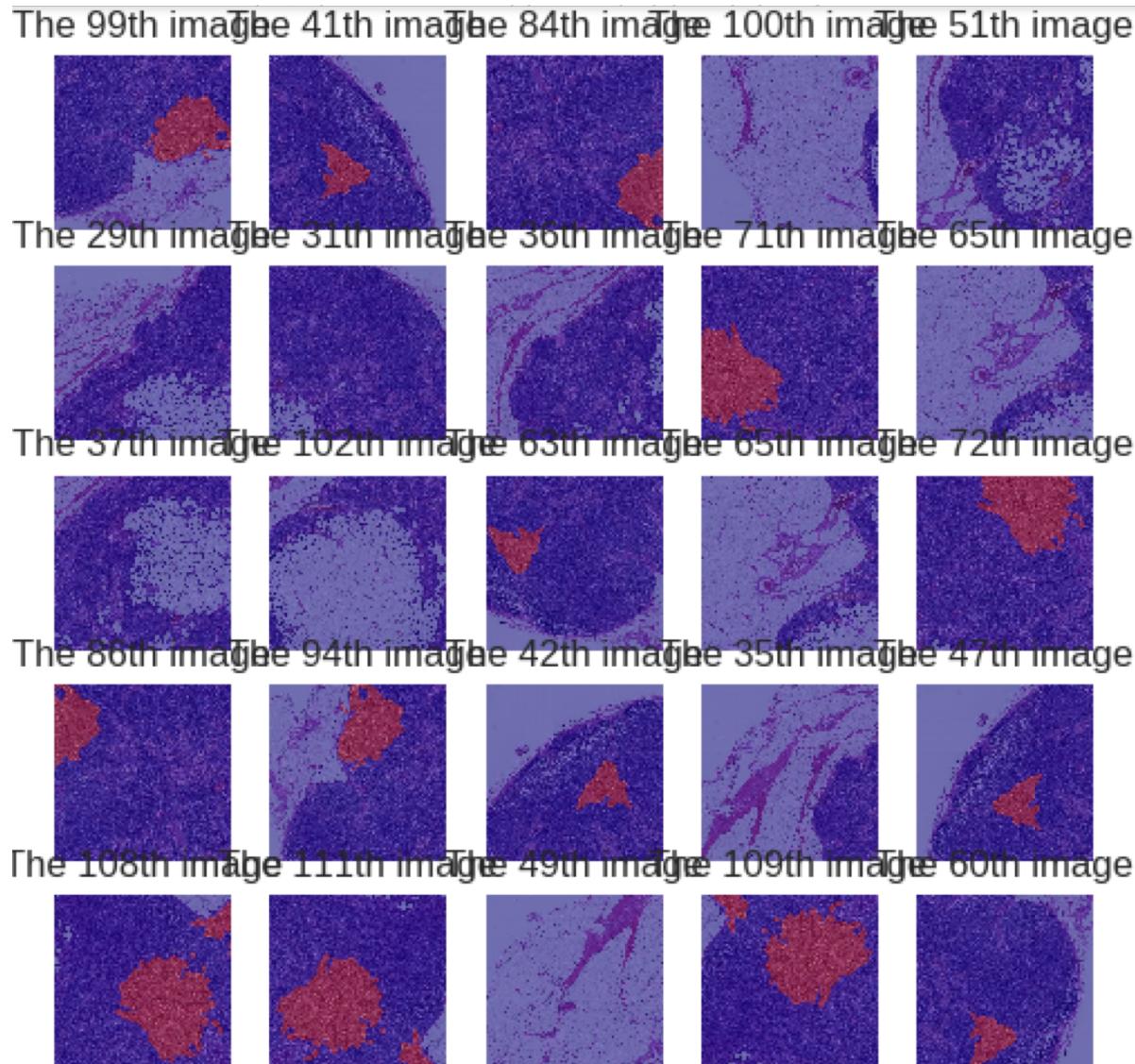
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Project: develop a tool to assist physician

- Detect cancer in gigapixel pathology images.
 - Given a collection of training data, develop a model that outputs a heatmap showing regions of a biopsy image likely to contain cancer.
- Challenge:
 - Large images ($> 100k \times 100k$ pixels)
 - Multiscale problem - need detail as well as context
 - **Imbalance data**
- Solution:
 - Multi-scale model with different levels
 - Data augmentation: Brightness, saturation, contrast, hue;
Rotate / flip

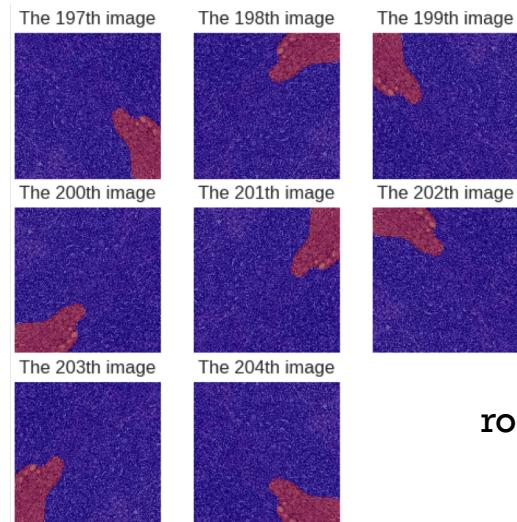


Data

Images from Level 3 with
a filter(tissue region > 20%)
(1335, 299, 299, 3)
val_split = 0.3

Label based on the center(:,128,128)->
0/1 = 743/592

Augmentation: 8 rotations

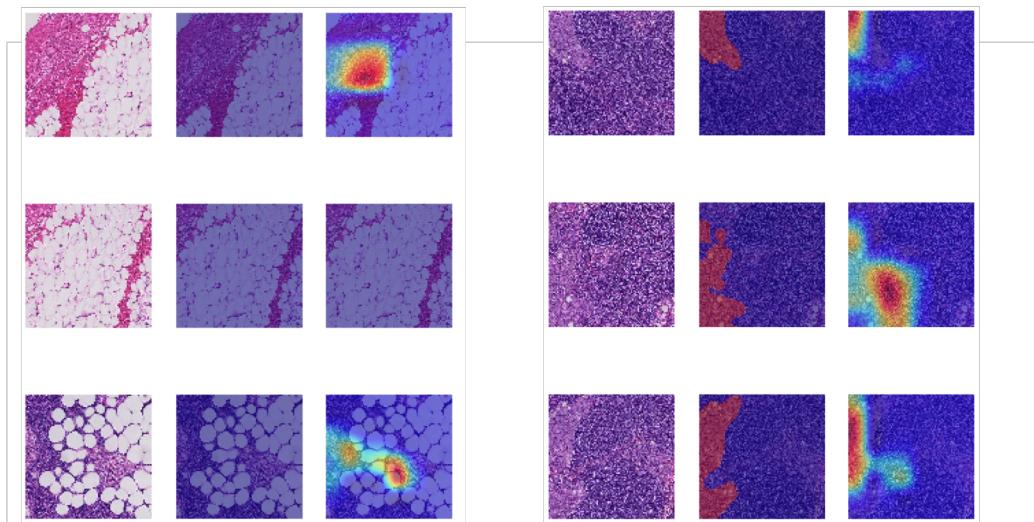


rotations



Fine-tuned Model

- **Model:**
 - Inception V3 (the last 50 layers + batch_normalizations are trainable)
 - GloAvgPooling
 - Dense
- **Loss:** "binary_crossentropy"
- **Optimizer:**
 - RMSPropOptimizer (learning rate = 0.002, momentum=0.9, epsilon=1.0)



Scratched Model

- Scratched Model:

- 13 Conv layers with (batch normalization + LeakyReLU + some MaxPooling2D)

- GloAvgPooling

- Dense(1024), dropout=0.25

- Loss: "binary_crossentropy"

- Optimizer:

- AdamOptimizer (0.00005 with patience=10, 0.000001 with patience=2)

Multi level

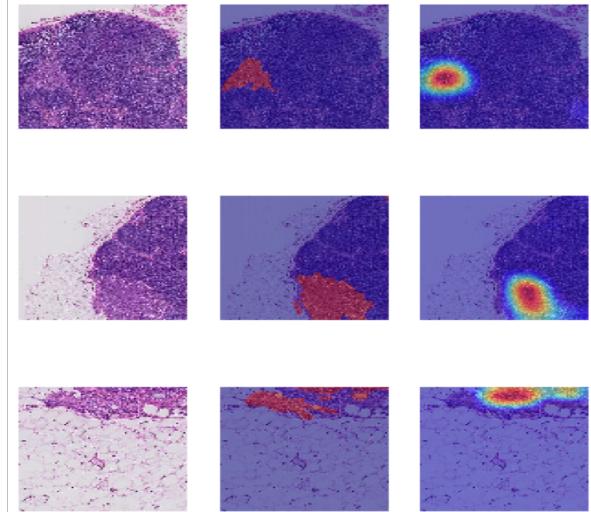
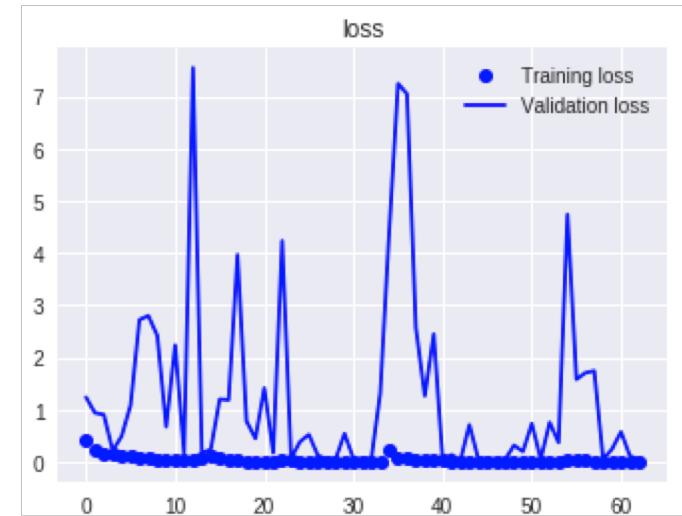
Images from

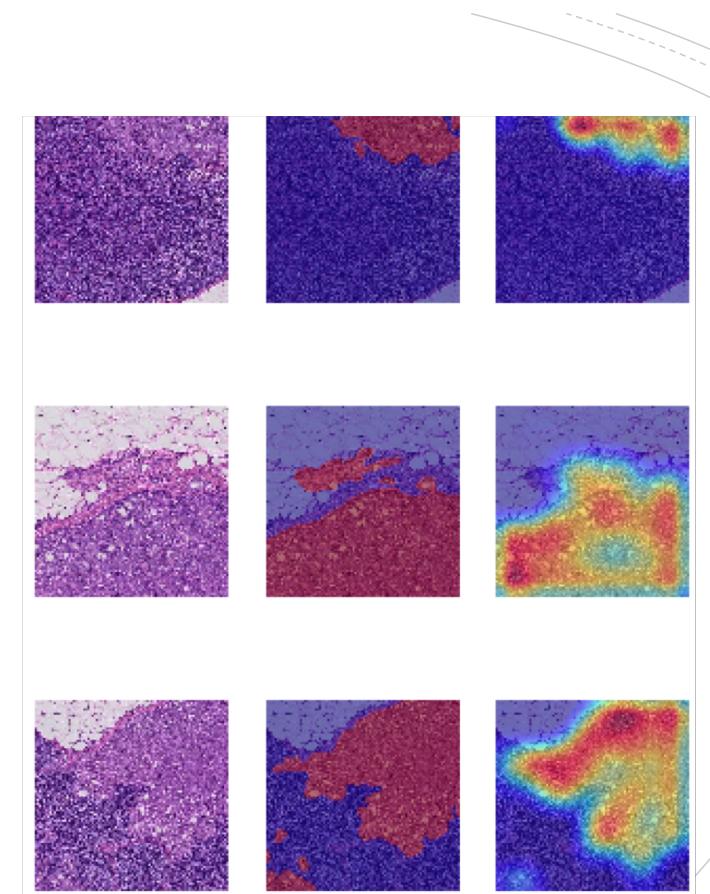
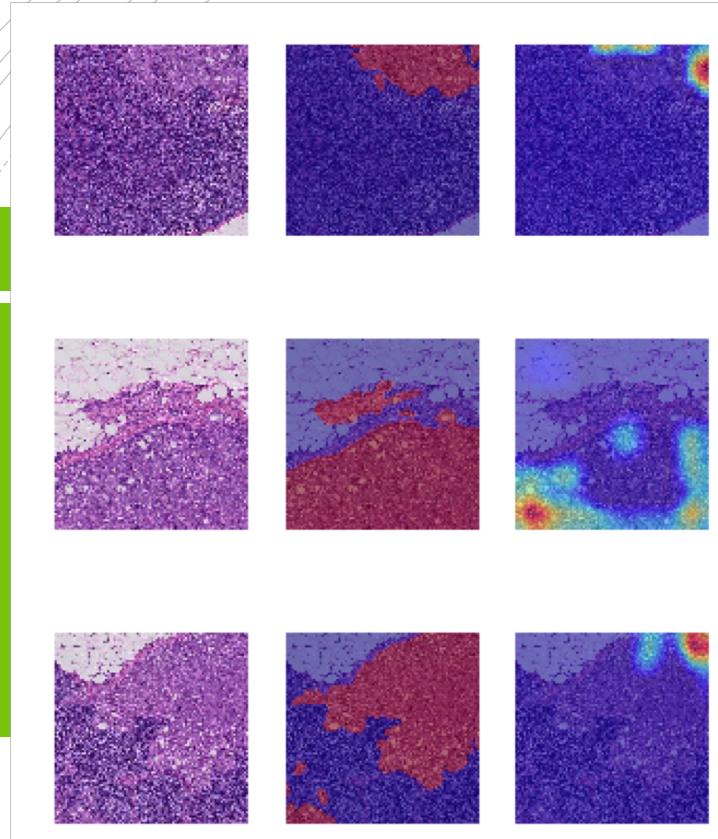
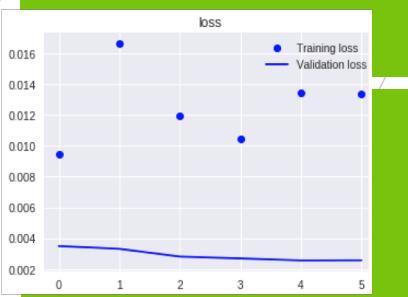
Level 6,7 or 7,8 or (6,7,8)

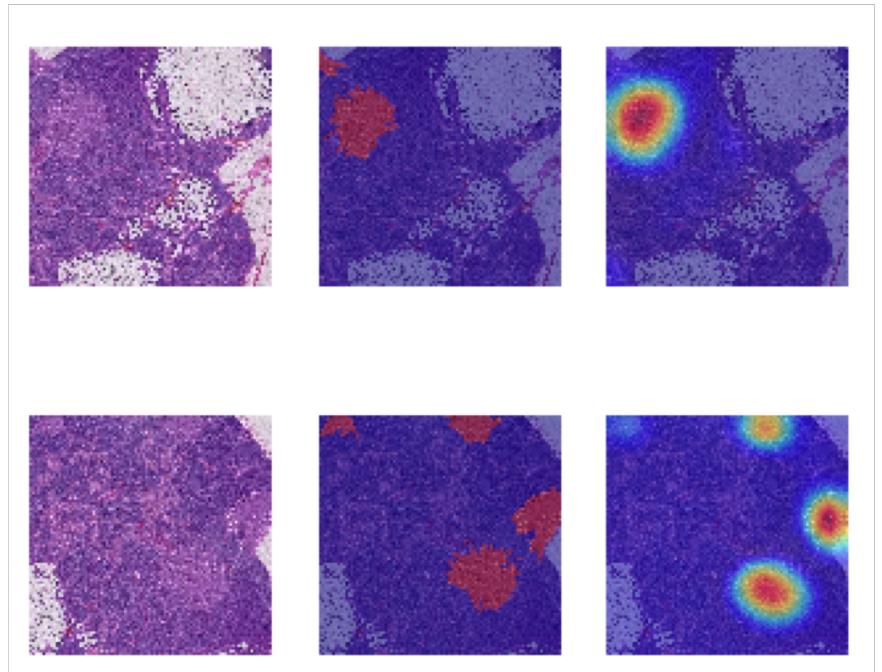
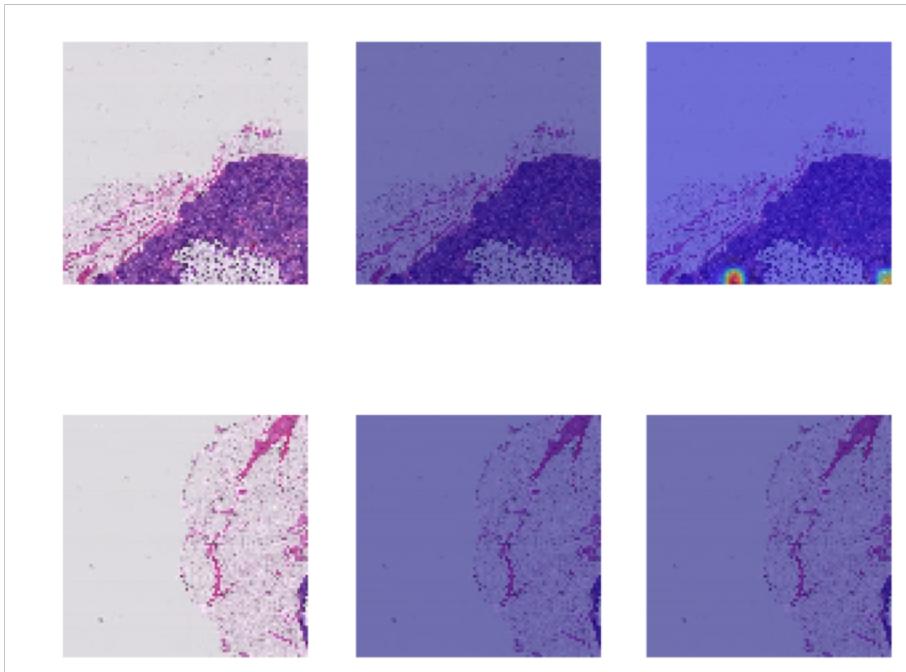
a filter(tissue region > 20%)

val_split = 0.3

Label based on the center(:,128,128)-> 0/1= 0.49

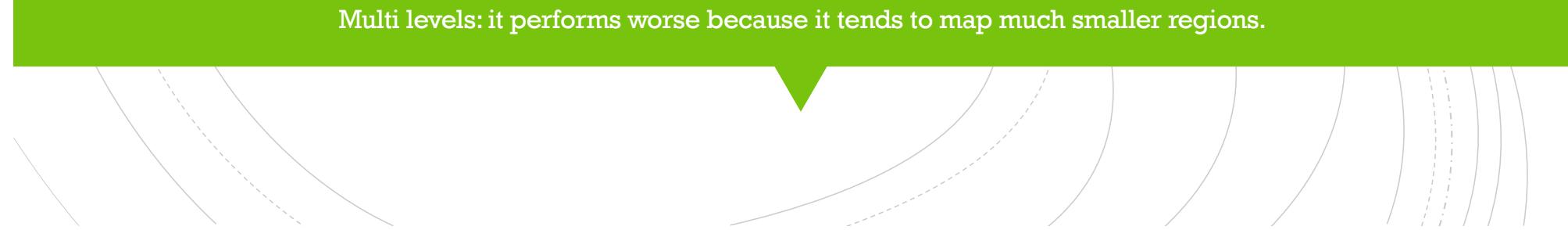


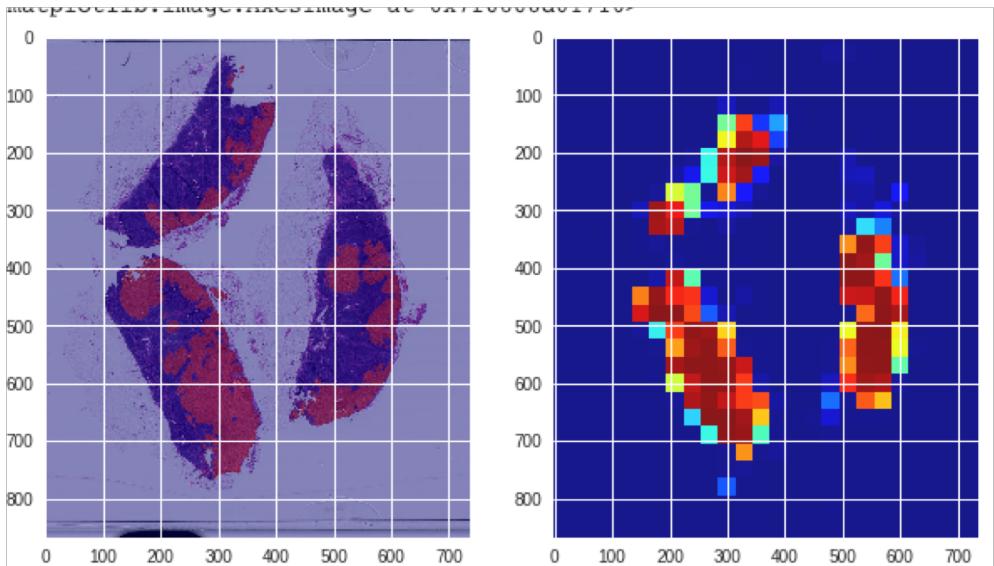
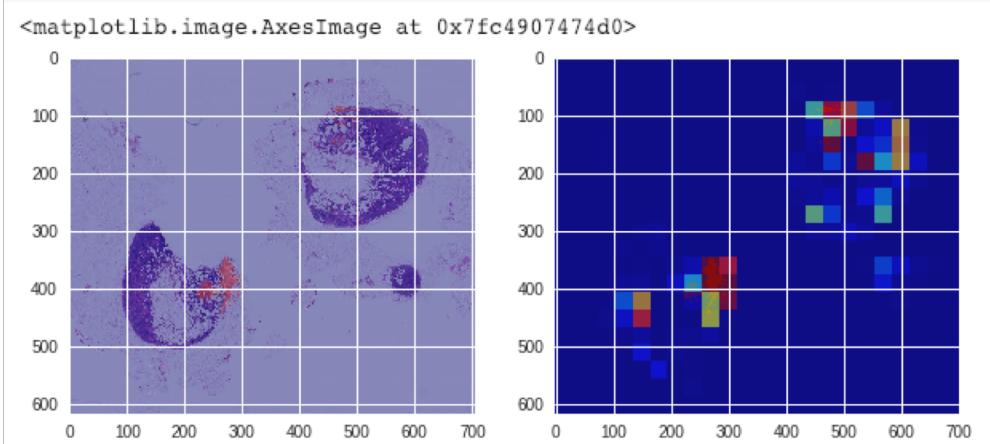




Level 7 Result

Multi levels: it performs worse because it tends to map much smaller regions.





Unupdated