

Classification of human breast lesions into **M**alignant and **B**enign in 3D ABUS

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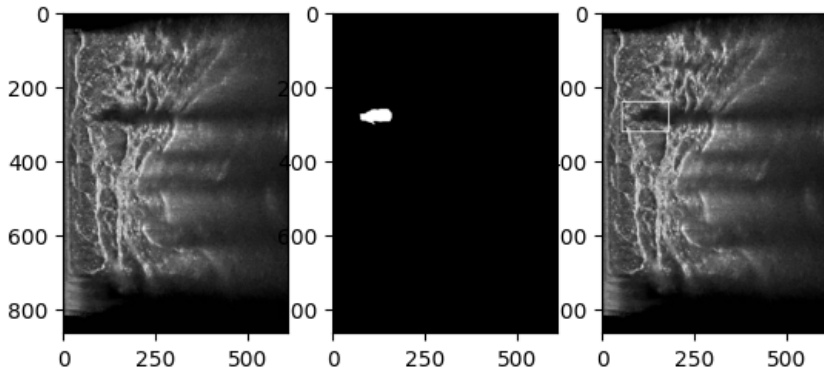
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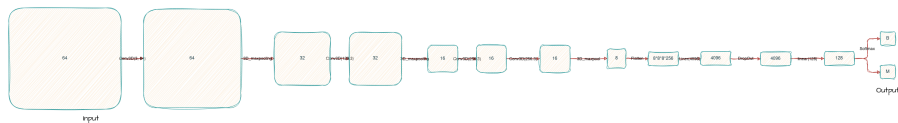
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Problem statement

- Having a 3D Volume of breast scanned using Ultrasound, we want to classify the detected lesion.
- The lesion mask which is the pixelwise segmentation of real lesion in the volume labeled by an expert radiologist is also present and we can either include the mask in our training process or not.
- There are two datasets available for the task:
 - ① A private dataset collected for the segmentation task and might not be so helpful in classification tasks. (due to class imbalance and high similarity between some cases in opposite classes.)
 - ② TDSC data set which is recently published for a global challenge consists of 100 samples (50 malignant - 50 benign) for training, 30 for validation and 70 for testcases. (Only training data is available)



3D-VGG with input size of 64



3D-VGG with input size of 64

Network features

- Convolutions: 3D convolutions.
- Loss function: Binary cross entropy loss
- Optimizer: Adam

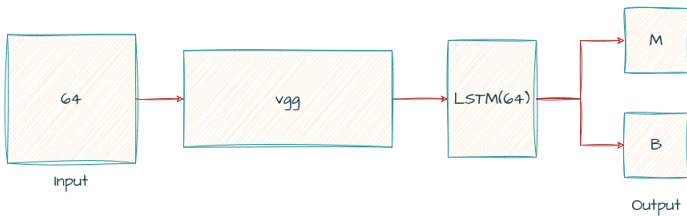
Results

- Private data set: Failur (52% training accuracy)
- TDSC: Not tested yet.

Pretrained 3D-VGG with input size of 64

- 1 Pretrain network using hande made shapes. (Triangle, Rectangle, circle, star, ...)
- 2 Use non leason background for handcraft shapes.

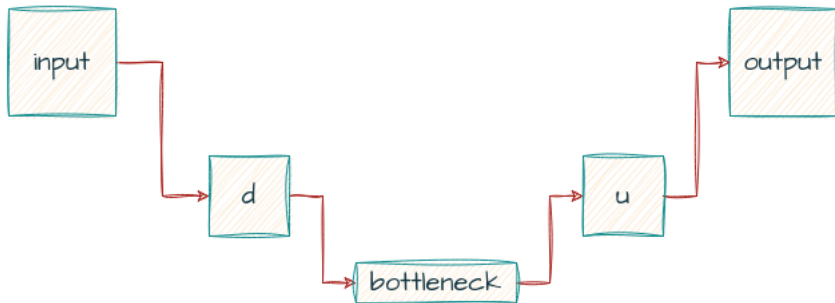
2D VGG and LSTM



2D VGG and LSTM

- 1 Pretrain VGG.
- 2 Pretrain VGG with handcrafted shapes.
- 3 Pretrain VGG with handcraftd shapes and use non leason background.

Multitask Learning



Conclusion

- The private dataset is not suitable for classification task and we need a more balanced dataset.
- TDSC dataset is balanced but each slice is not related to its excisor and priors.
- Available model and papers should be tested on this dataset.