Task1.超声产品沟通

现阶段沟通结果

老师比较忙，目前已经与手下已毕业的博士生沟通过，答复为：**私有数据集暂不能共享，但应该可以展开合作**
合作单位为：东北大学医学与生物信息工程学院 **医学成像与智能分析教育部工程中心**
负责老师为：**马贺** 医学与生物信息工程学院副院长 医学成像与智能分析教育部工程中心副主任

下一步需求

明确合作方式，沟通能否合作

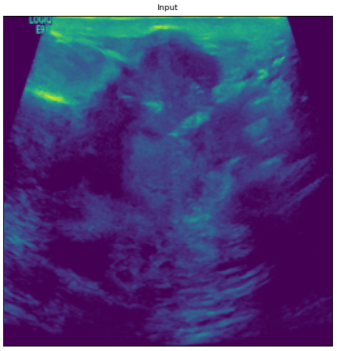
Task2.web锻展示模型

数据集

暂用公开数据集**BUSI**(Breast Ultrasound Images Dataset)进行训练
https://academictorrents.com/details/d0b7b7ae40610bbeaea385aeb51658f527c86a16

模型选择

基于 **unet++** 的模型表现较差



暂不考虑使用

考虑到 **计算资源充足**，所以选用更复杂但能提取更多信息的**DeepLabV3-Plus**模型来取得更好的分割结果

模型结构

```
Model: "DeepLabV3-Plus"
__________________________________________________________________________________________________
Layer (type)                    Output Shape         Param #     Connected to
==================================================================================================
InputLayer (InputLayer)         [(None, 256, 256, 3) 0
__________________________________________________________________________________________________
conv1_pad (ZeroPadding2D)       (None, 262, 262, 3)  0           InputLayer[0][0]
__________________________________________________________________________________________________
conv1_conv (Conv2D)             (None, 128, 128, 64) 9472        conv1_pad[0][0]
__________________________________________________________________________________________________
conv1_bn (BatchNormalization)   (None, 128, 128, 64) 256         conv1_conv[0][0]
__________________________________________________________________________________________________
conv1_relu (Activation)         (None, 128, 128, 64) 0           conv1_bn[0][0]
__________________________________________________________________________________________________
pool1_pad (ZeroPadding2D)       (None, 130, 130, 64) 0           conv1_relu[0][0]
__________________________________________________________________________________________________
pool1_pool (MaxPooling2D)       (None, 64, 64, 64)   0           pool1_pad[0][0]
__________________________________________________________________________________________________
conv2_block1_1_conv (Conv2D)    (None, 64, 64, 64)   4160        pool1_pool[0][0]
__________________________________________________________________________________________________
conv2_block1_1_bn (BatchNormali (None, 64, 64, 64)   256         conv2_block1_1_conv[0][0]
__________________________________________________________________________________________________
...
Total params: 11,858,752
Trainable params: 11,826,016
Non-trainable params: 32,736
```

环境配置

模型训练与验证的代码集合在**Jupyter**笔记本中
主要环境为：**tensorflow-gpu=2.6.0, cuda 11.3**

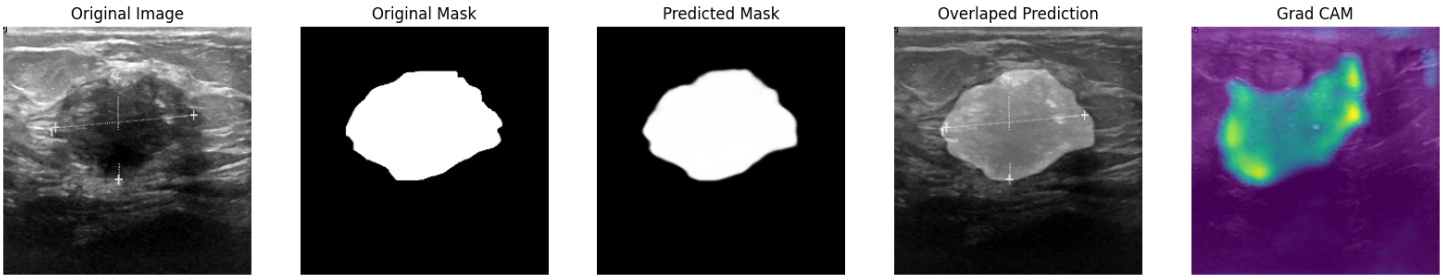
模型效果

exmaple1:

example2:

example3:

example4:



example5:

可以看到模型的效果卓越

模型部署

经过学习准备使用**Flask框架**开发建议网页demo

样例网站（X-ray） http://mammo.neuralrad.com:5300/upload

Upload Mammogram Image File (jpg)

Choose File No file chosen Analyze

We will not store your data on our server. Please don't worry about any privacy issues. Thank you!

This tool is only to provide you with the awareness of breast mammogram, not for diagnosis.

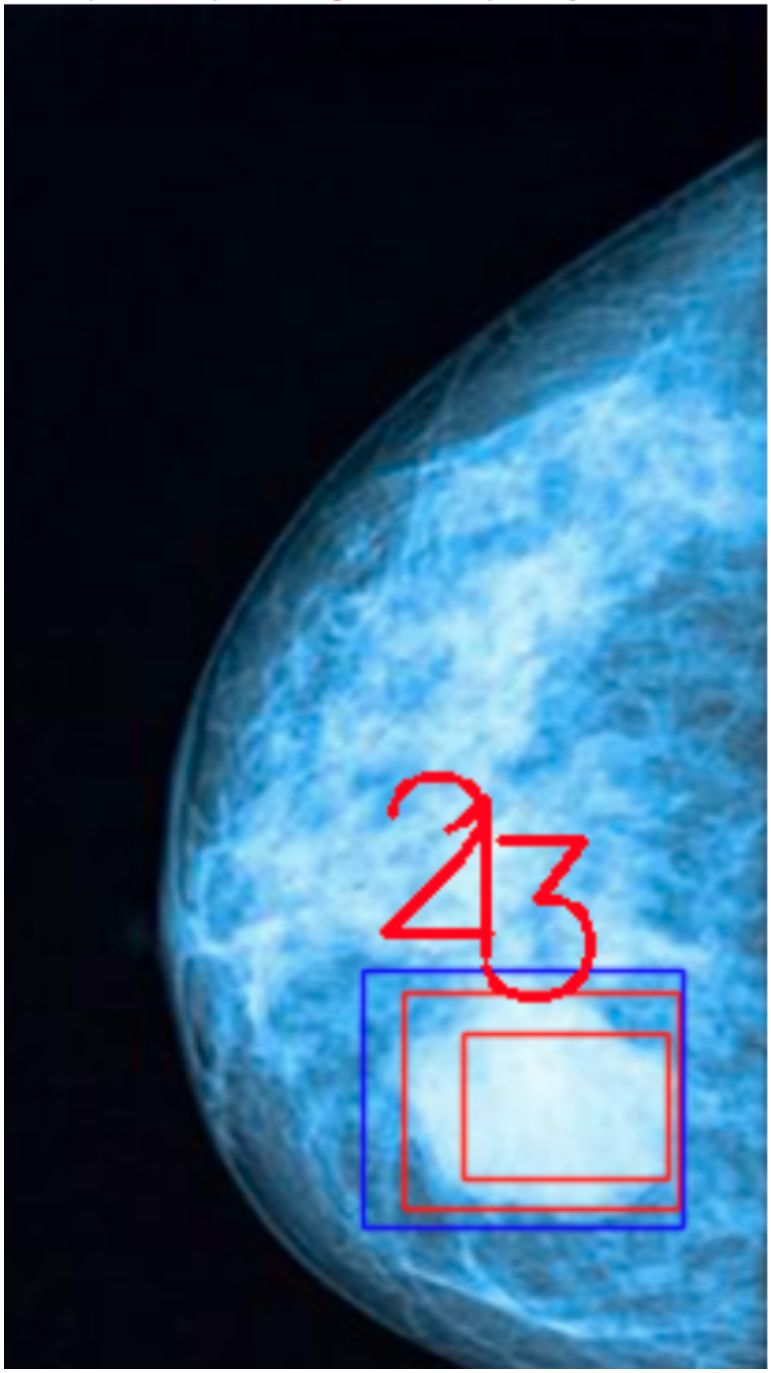
This tool is not FDA approved and please do not use it for any diagnostic purposes.

The following results are not diagnosis, please consult your physicians for any diagnostic information.

1. Model prediction of possible malignant mass with possibility at 71.74% --- location at box index: [107.55042 265.5234 181.90788 323.36273]
2. Model prediction of possible benign mass with possibility at 31.74% --- location at box index: [96.094666 259.38803 182.9243 328.2189]
3. Model prediction of possible malignant mass with possibility at 24.70% --- location at box index: [123.00956 276.7232 178.15868 315.09952]

--------- The above masses are plotted on the image ----------

4. Model prediction of possible malignant calcification with possibility at 19.47% --- location at box index: [107.55042 265.5234 181.90788 323.36273]
5. Model prediction of possible benign calcification with possibility at 12.96% --- location at box index: [107.55042 265.5234 181.90788 323.36273]
6. Model prediction of possible benign mass with possibility at 12.80% --- location at box index: [117.241135 272.4749 176.25894 318.4531]
7. Model prediction of possible malignant mass with possibility at 12.25% --- location at box index: [83.0547 249.13503 192.74216 340.79404]



后续工作

由于目前主流框架**Tensorflow**与**Pytorch**的部署方式有很大不同，计划先开发技术较成熟的Tensorflow模型的部署，后开发Pytoch模型的部署,便于日后展示基于不同框架开发的模型效果