

# MULTI-TASK U-NET MODEL FOR BREAST ULTRASOUND IMAGE



**24341216-FAHAD NADIM ZIAD**

**22101617-SUCHITRA BARUA**

**24141187-FAHAD AL SHAHID**

**22101664-FAIRUZ BINTE KHALED**

**GROUP-08**

# OBJECTIVES

---



Model Architecture Diagram



Quantitative Results



Qualitative Examples

# Model Architecture Diagram

# multi-task U-Net model

- Encoder
- bottleneck
- decoder

Segmentation  
Multi-scale classification head

---

# QUANTITATIVE RESULTS

# Training Metrics

```
    === Training Metrics ===
    === Train Segmentation Metrics ===
Dice Coefficient: 0.6417
Pixel Accuracy: 0.9382
Mean IoU: 0.4725

    === Train Classification Metrics ===
Accuracy: 0.7871
Precision: 0.7883
Recall: 0.7871
F1 Score: 0.7876

Classification Report:
              precision      recall   f1-score  support
benign          0.8378     0.8185     0.8280      303
malignant        0.7081     0.7215     0.7147      158
normal           0.7647     0.7959     0.7800       98
accuracy          0.7871
macro avg        0.7702     0.7786     0.7743      559
weighted avg     0.7883     0.7871     0.7876      559
```

# Test Metrics

```
    === Test Metrics ===
    === Train Segmentation Metrics ===
Dice Coefficient: 0.6417
Pixel Accuracy: 0.9382
Mean IoU: 0.4725

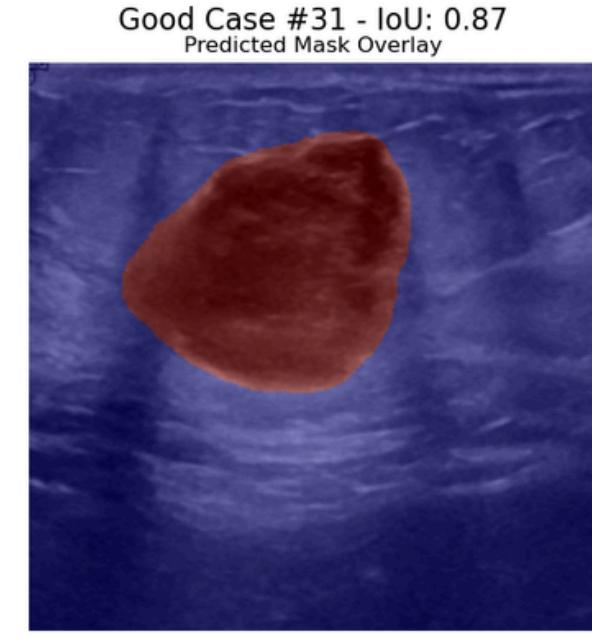
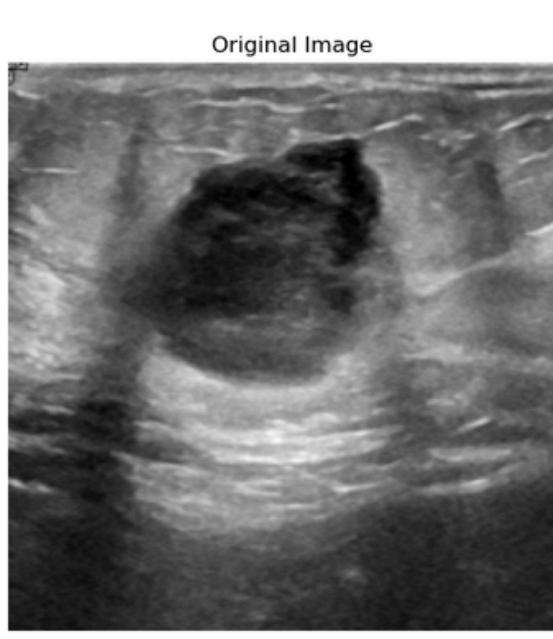
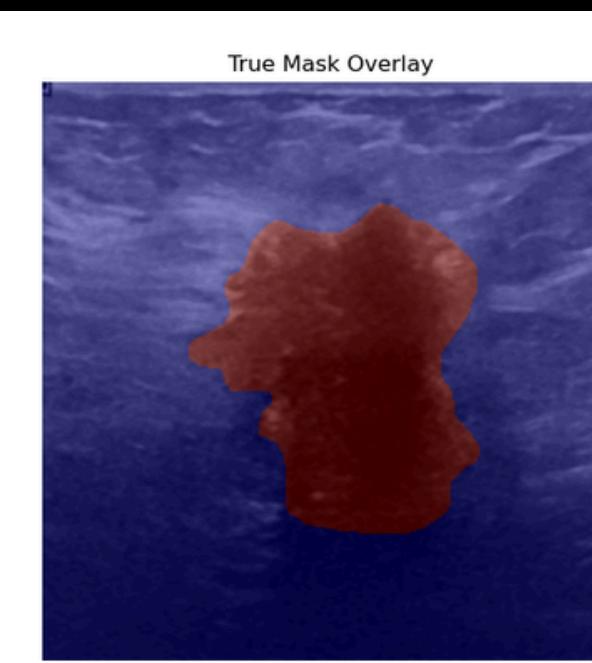
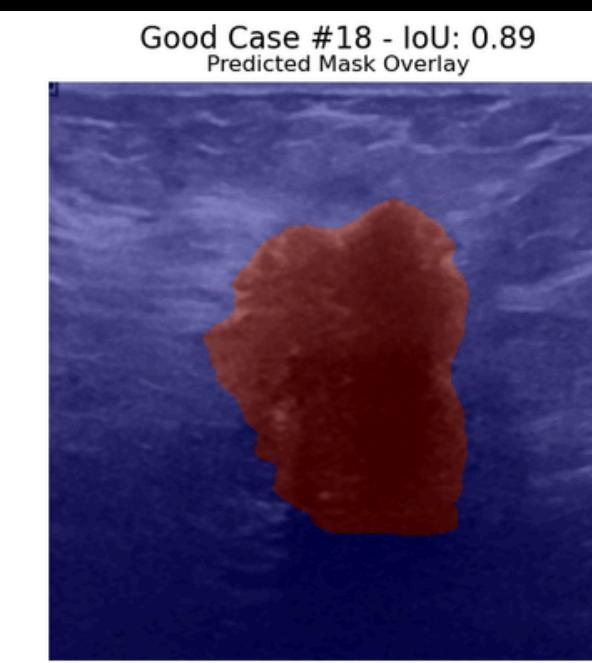
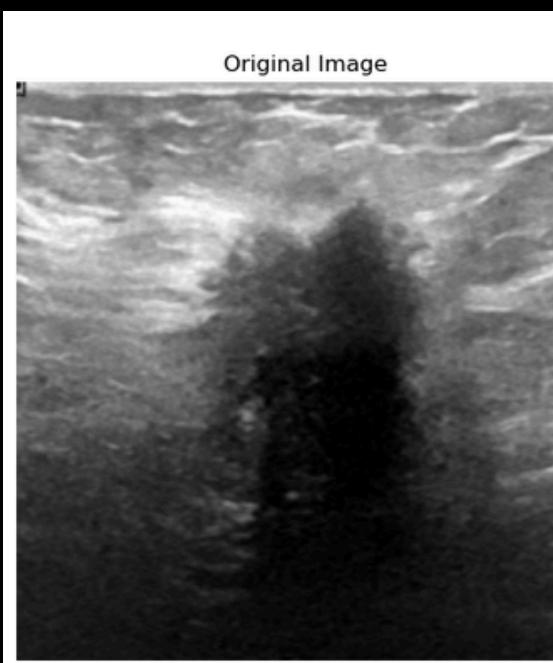
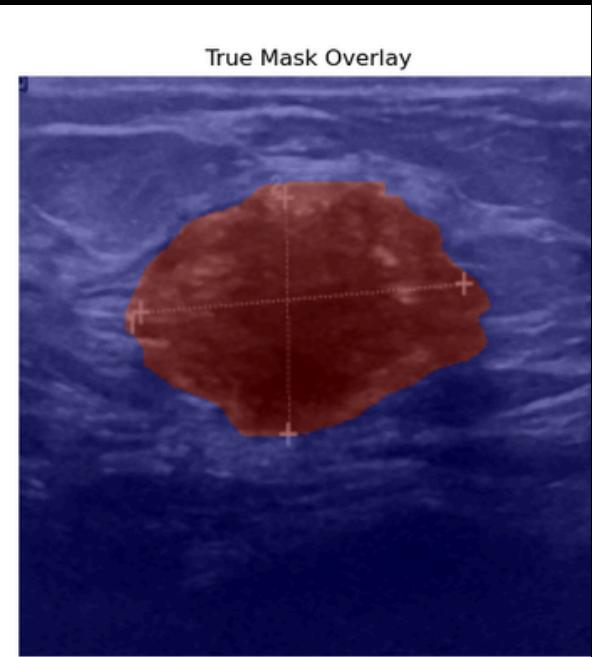
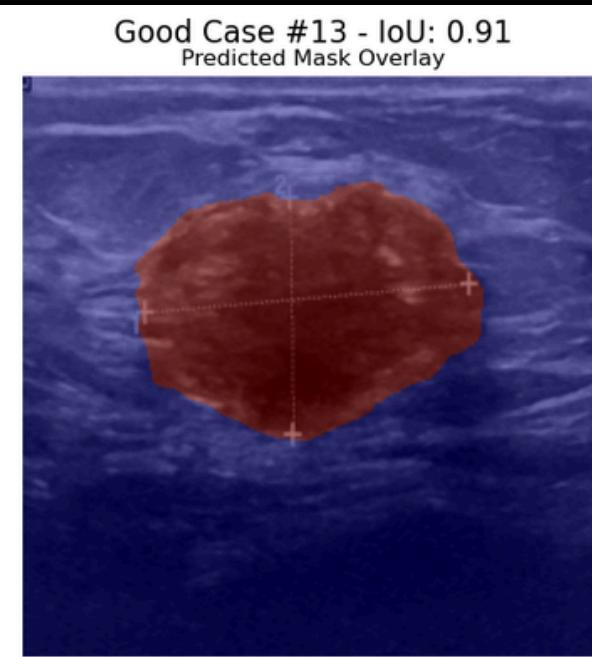
    === Train Classification Metrics ===
Accuracy: 0.7871
Precision: 0.7883
Recall: 0.7871
F1 Score: 0.7876

Classification Report:
      precision    recall  f1-score   support
benign          0.8378    0.8185    0.8280      303
malignant        0.7081    0.7215    0.7147      158
normal           0.7647    0.7959    0.7800       98
accuracy          0.7871          -          -      559
macro avg        0.7702    0.7786    0.7743      559
weighted avg     0.7883    0.7871    0.7876      559
```

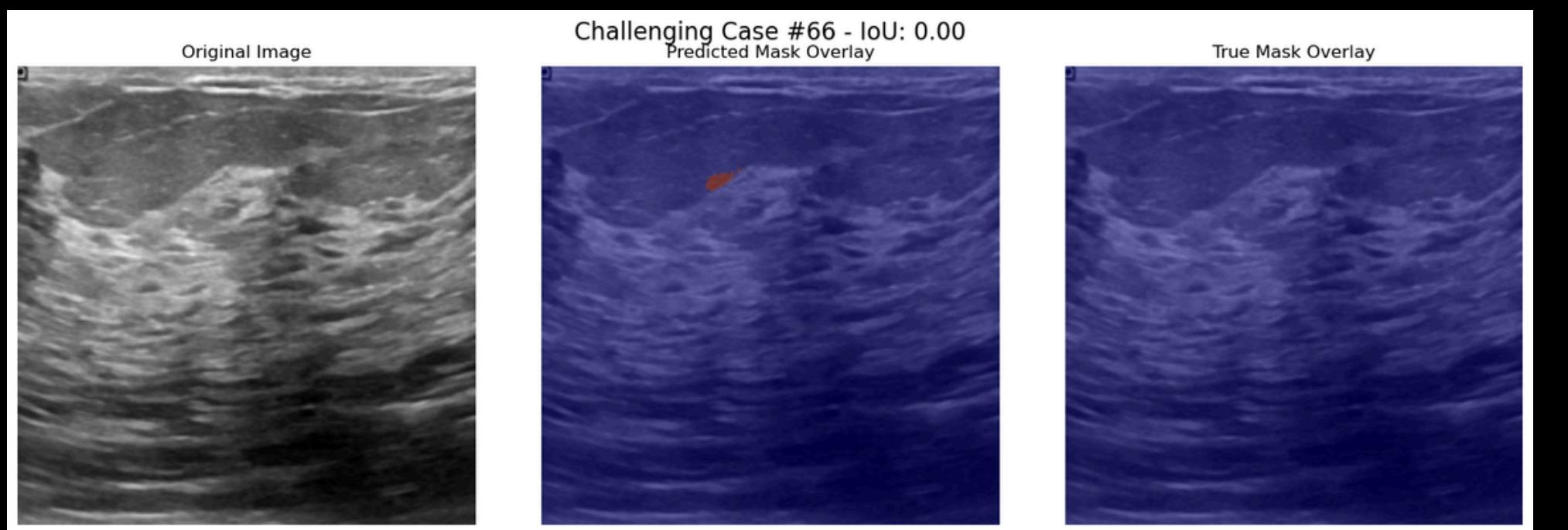
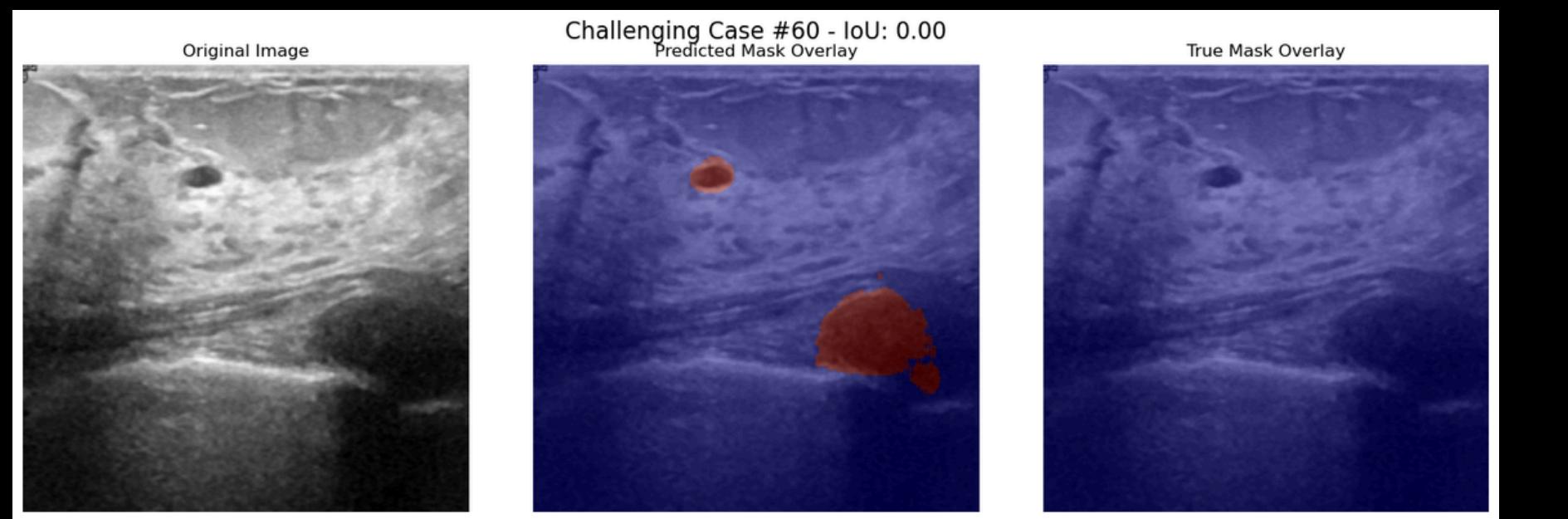
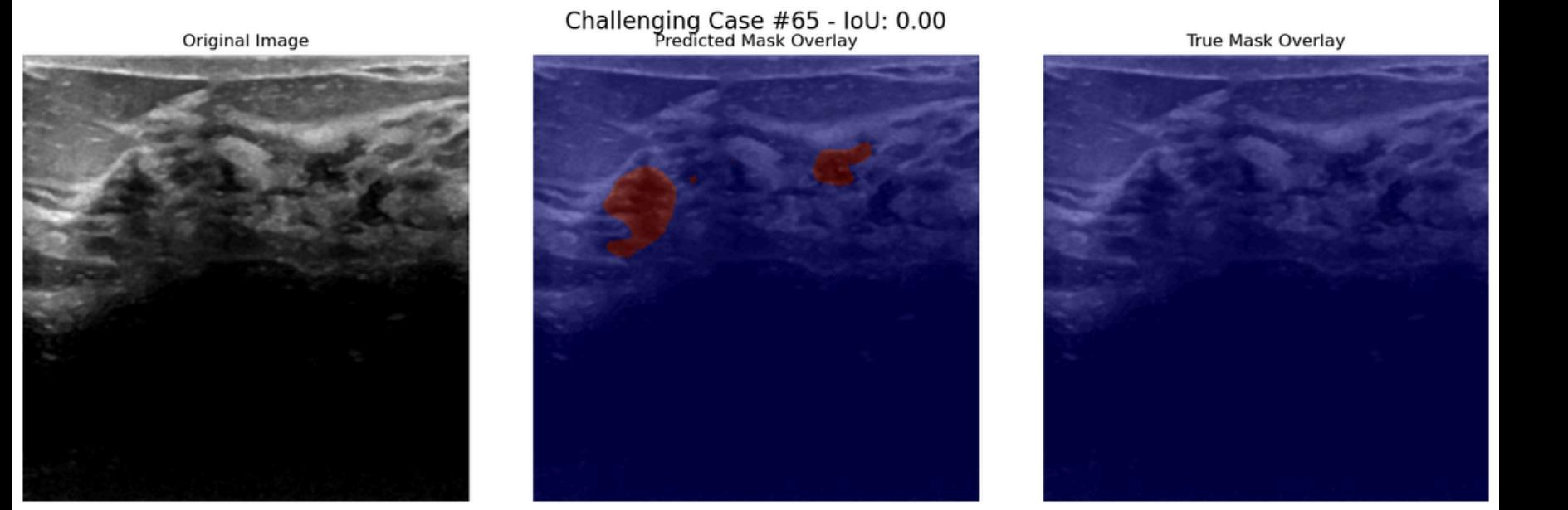
---

# QUALITATIVE RESULTS

# Good Cases

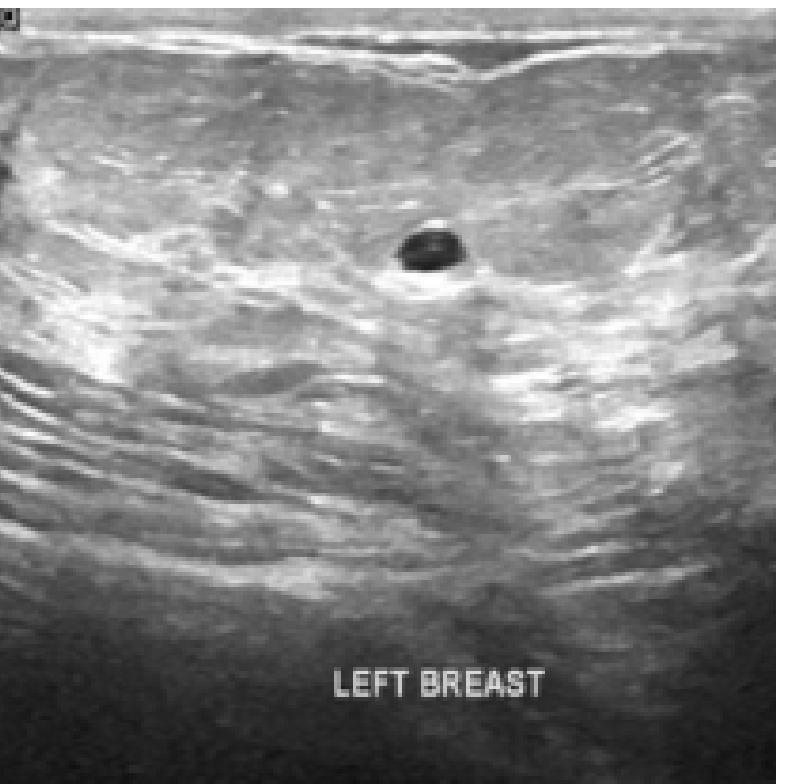


# Challenging Cases

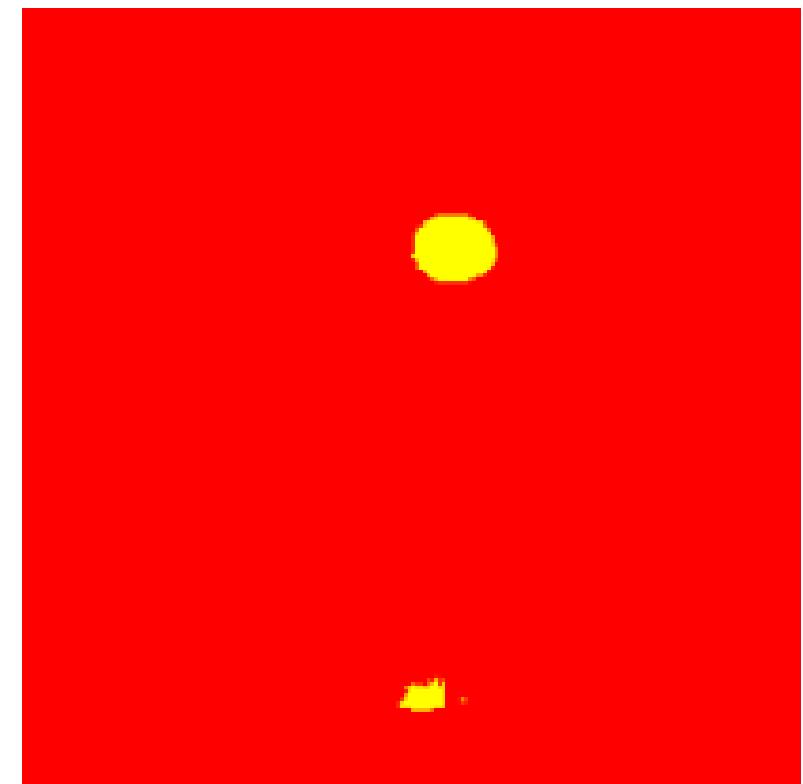


# **Test Demo**

Image: 01.png

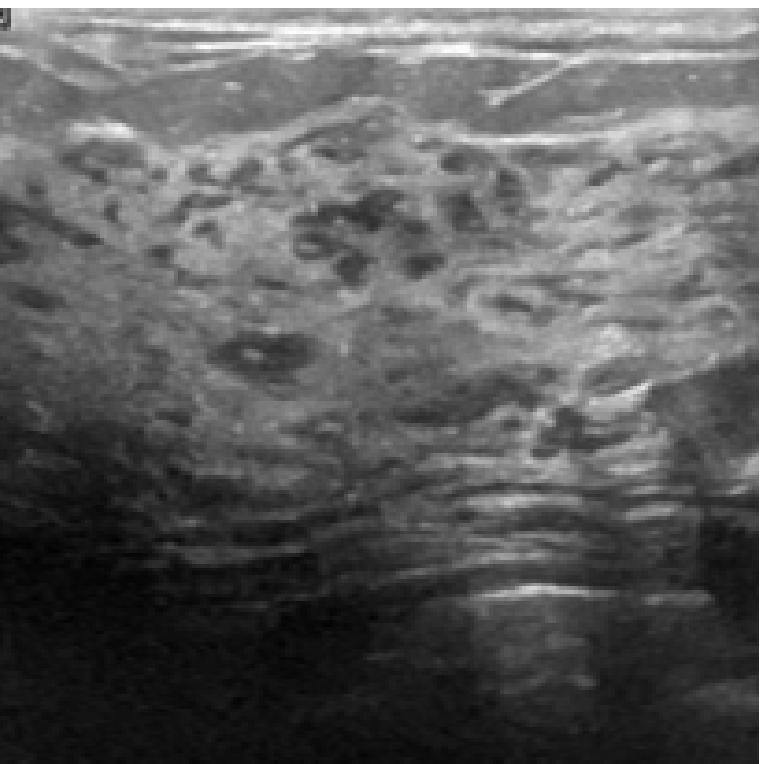


Predicted class: benign  
Predicted Mask



Predicted class: benign

Image: 03.png

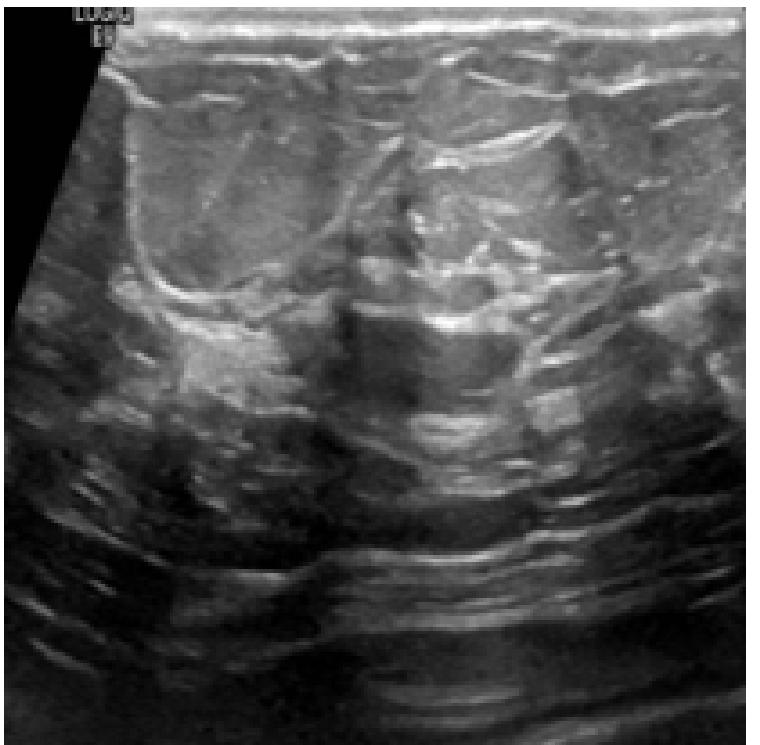


Predicted class: normal  
Predicted Mask



Predicted class: normal

Image: 02.png

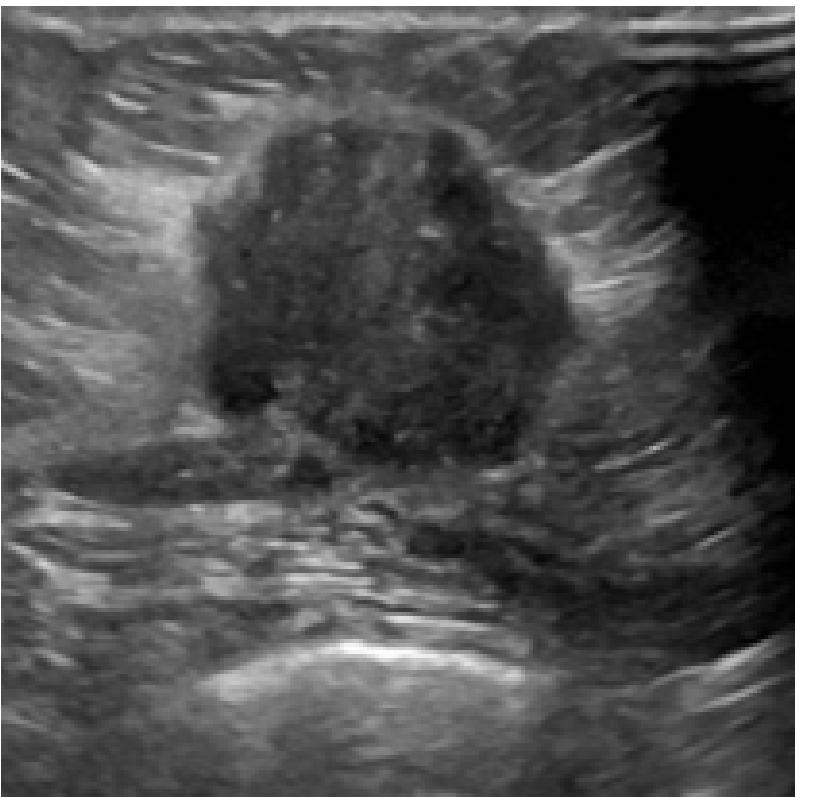


Predicted class: malignant  
Predicted Mask

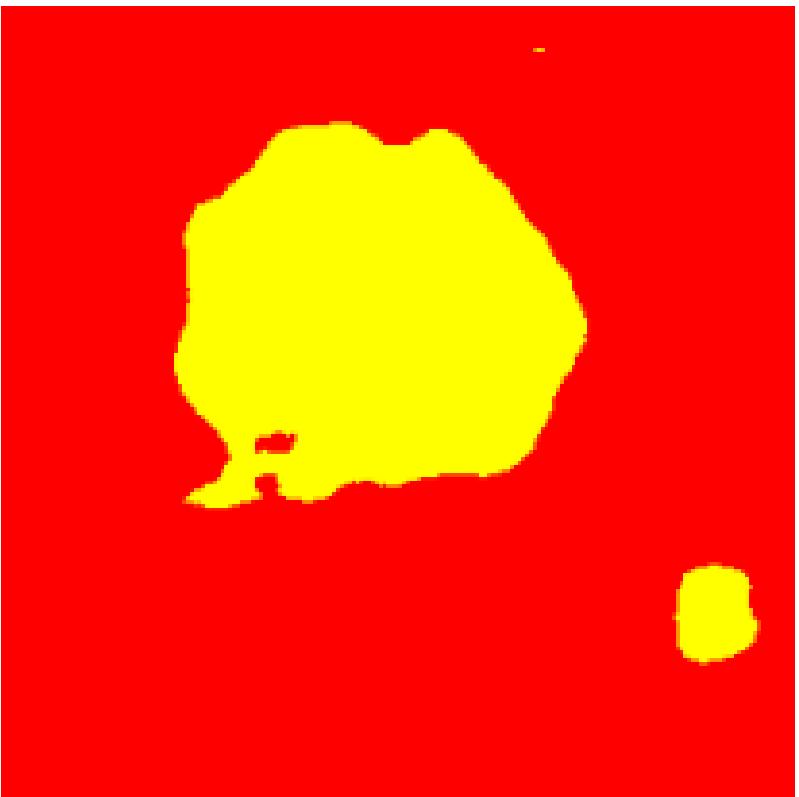


Predicted class: malignant

Image: 04.png



Predicted class: malignant  
Predicted Mask



Predicted class: malignant



*Thank  
You*