

# Ultrasound Image Classification Pipeline

## Brief Write-up and Pipeline Overview

This repository contains the code for a machine learning pipeline to classify ultrasound images into healthy and unhealthy categories using a MobileNet-based model. The pipeline includes data preprocessing, model training, and evaluation.

## Pipeline Overview

### 1. Data Preprocessing:

- The image data is read from an Excel sheet containing class labels.
- Images are preprocessed using the MobileNet preprocessing function, including augmentation techniques like zoom, shear, and horizontal flip.

### 2. Model Architecture:

- The base MobileNet model is utilized, with the final layer modified for binary classification.
- The model is compiled using the Adam optimizer, binary cross-entropy loss, and multiple evaluation metrics (Recall, Accuracy, Precision, and AUC).

### 3. Training:

- The model is trained using the specified dataset, with checkpoints and early stopping callbacks.

## Results on Validation Dataset

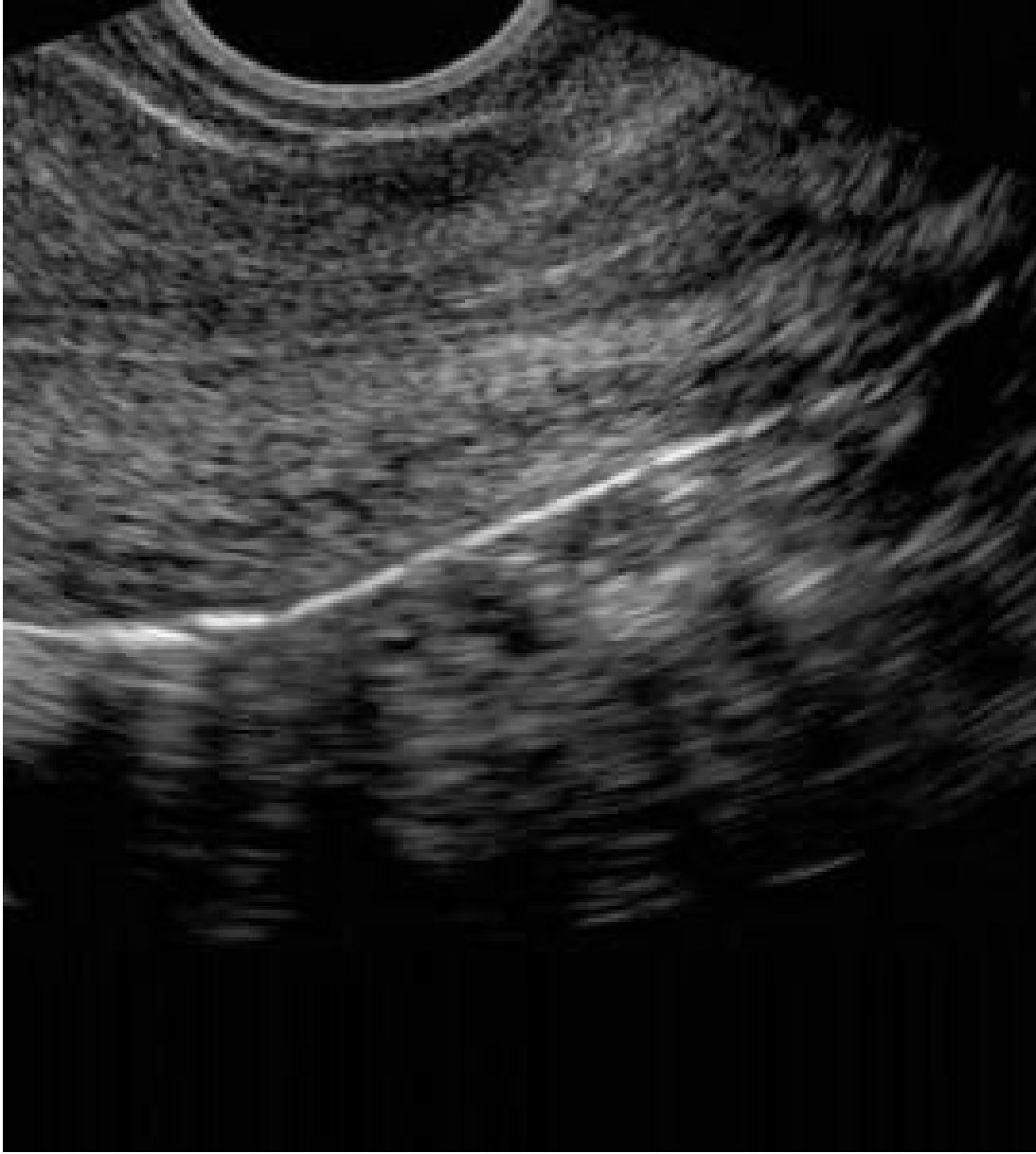
### *Evaluation Metrics Table*

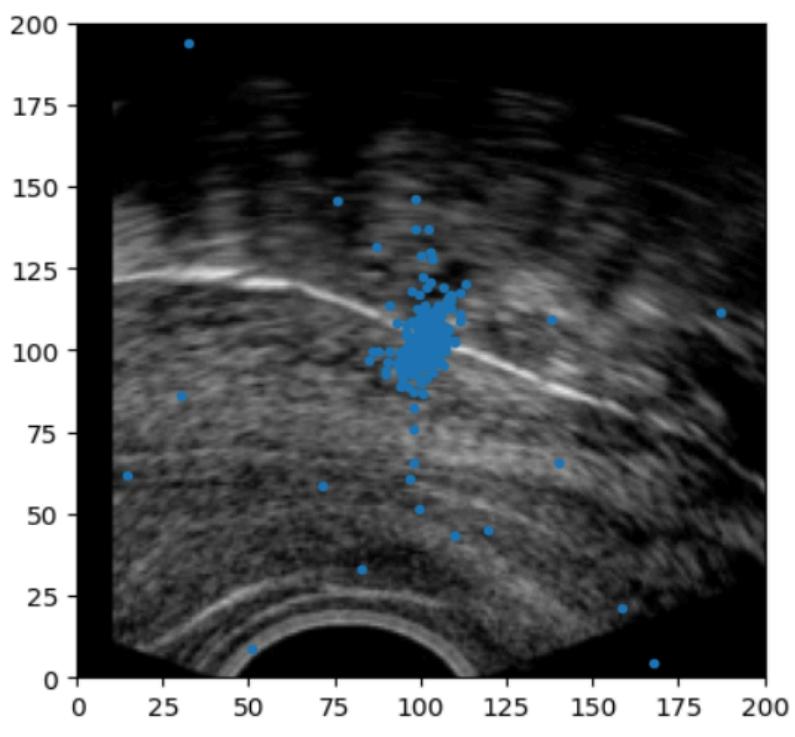
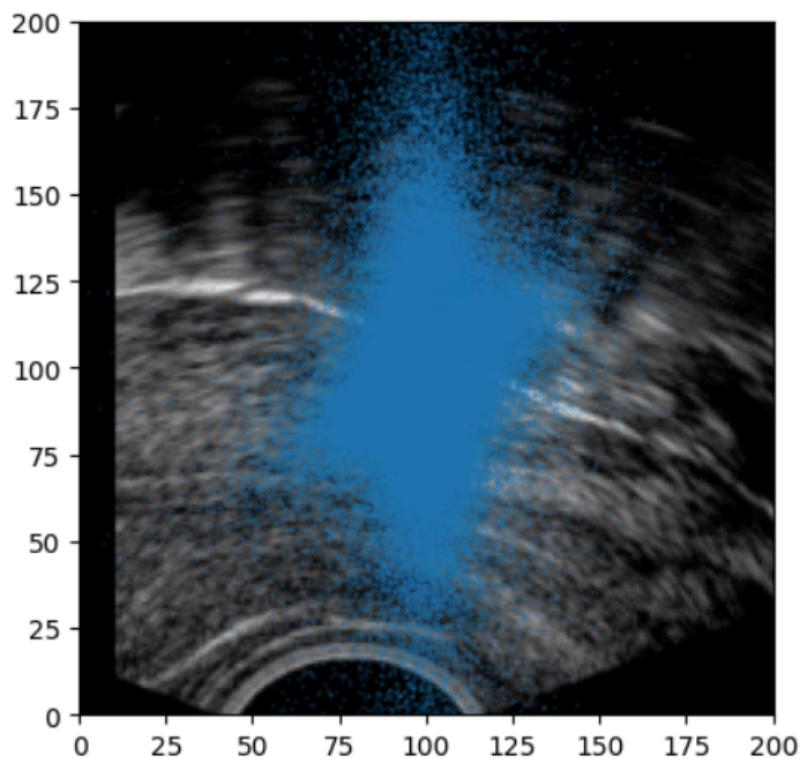
Loss	Recall	Accuracy	Precision	AUC
1.5586	0.6641	0.8146	0.6591	0.8049

Table. 1

## Classification and Interpretability Plots

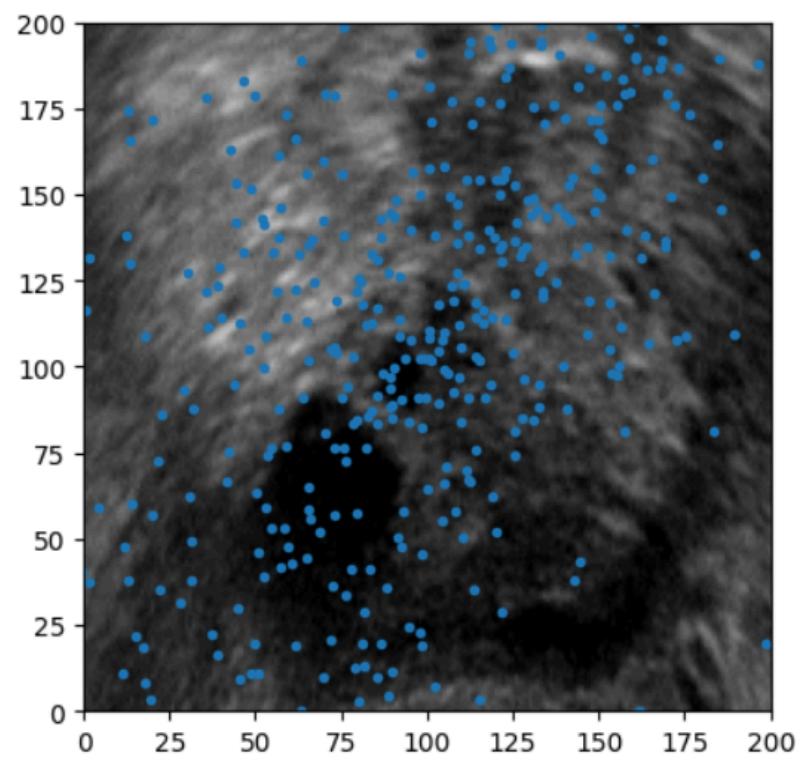
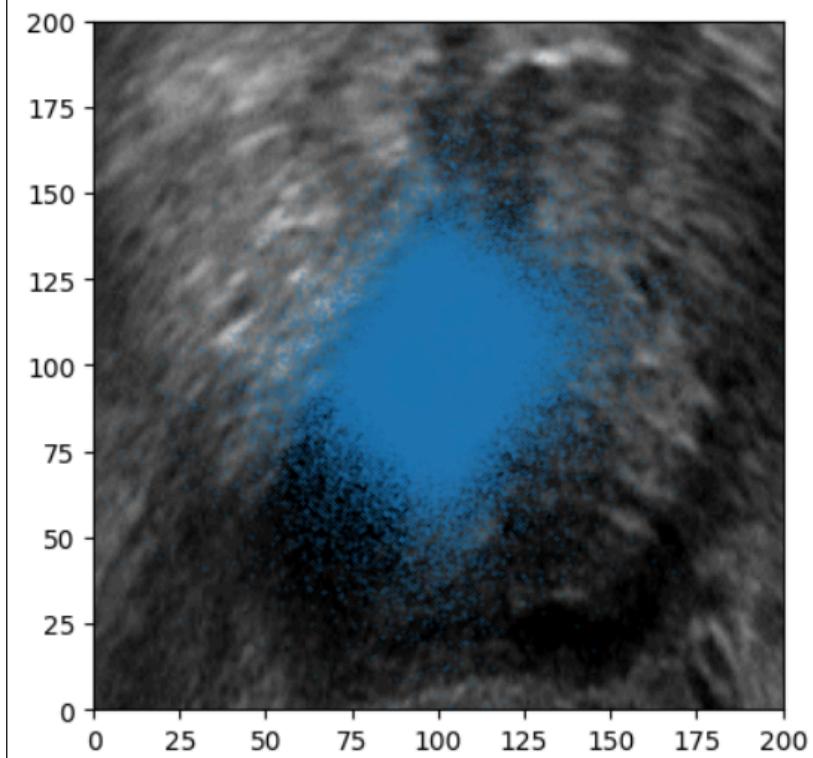
- The following are pictures of the top 5 frames selected from the validation dataset, along with interpretability plots at 600 DPI:

Image name	Interpretation Plot (1. Gradient Saturation 2. Integrated Gradient)
Image3823.jpg	 A grayscale ultrasound image showing a transverse abdominal scan. The image displays various internal organs, including what appears to be the liver, spleen, and surrounding abdominal structures. The image is grainy and has a typical sonographic appearance.



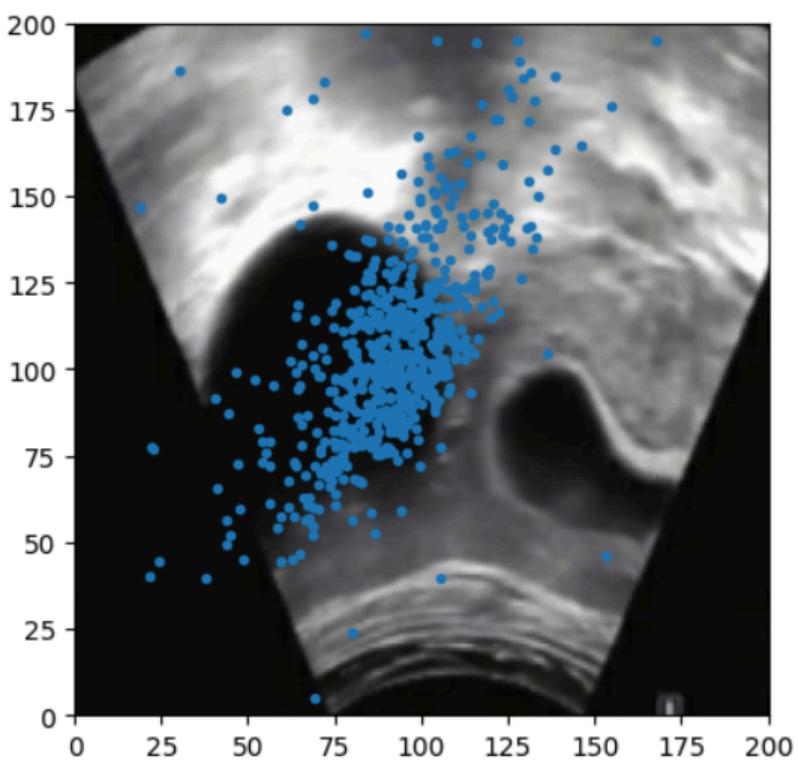
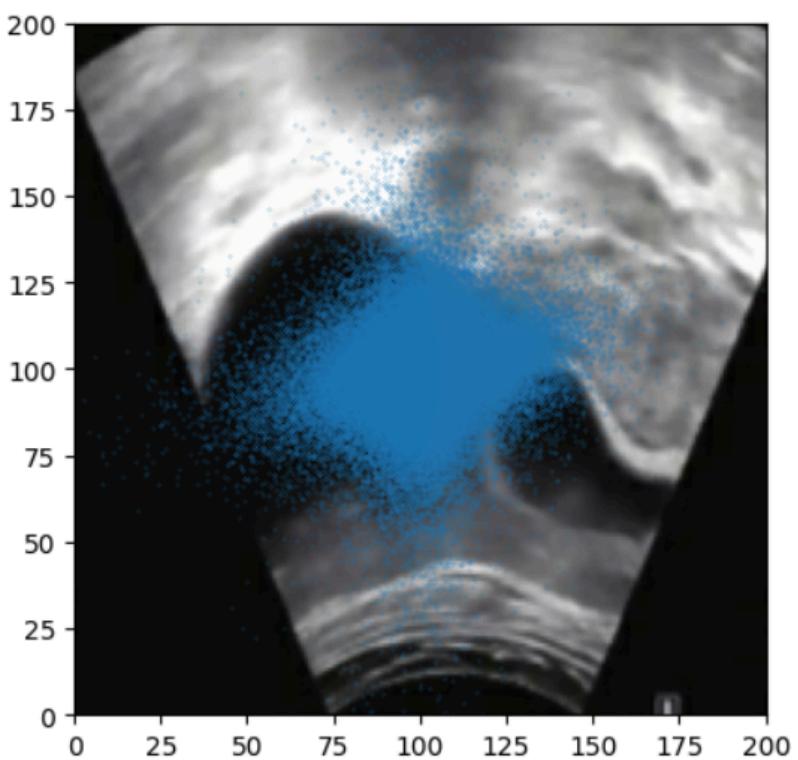
normal\_15.jpg





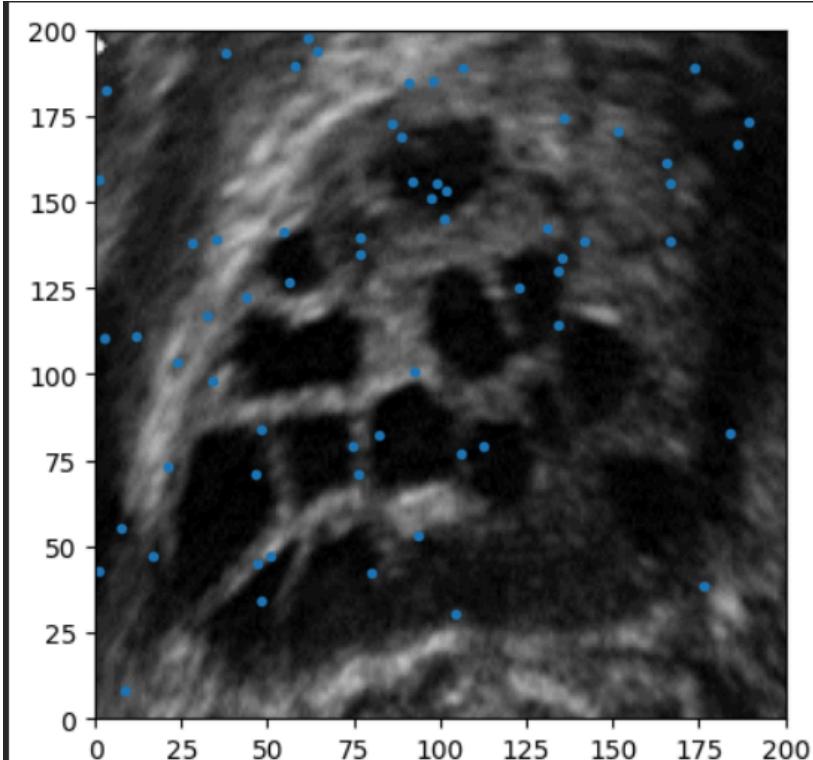
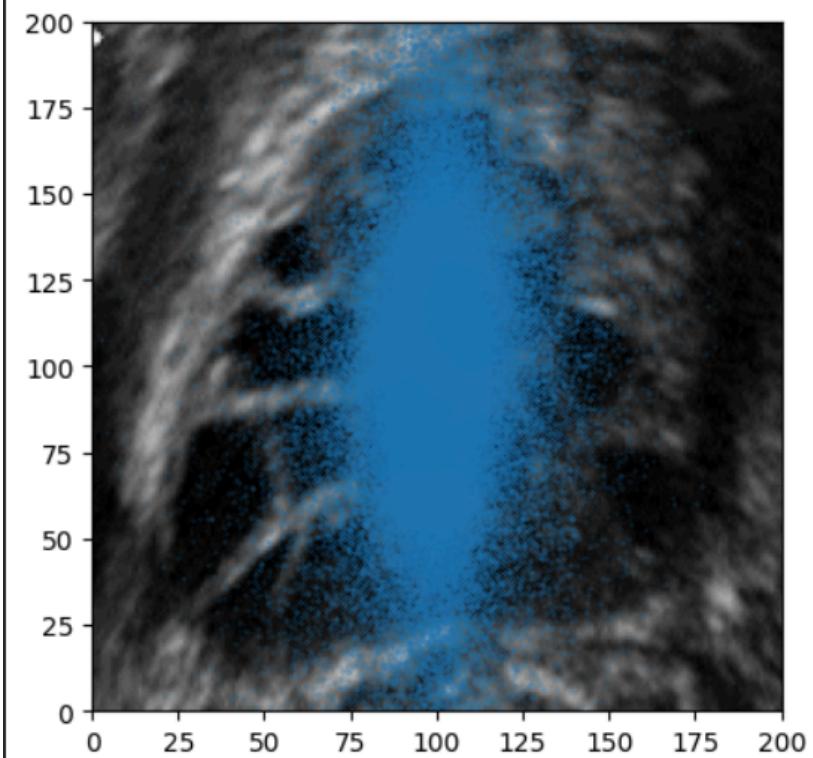
23image60.jpg





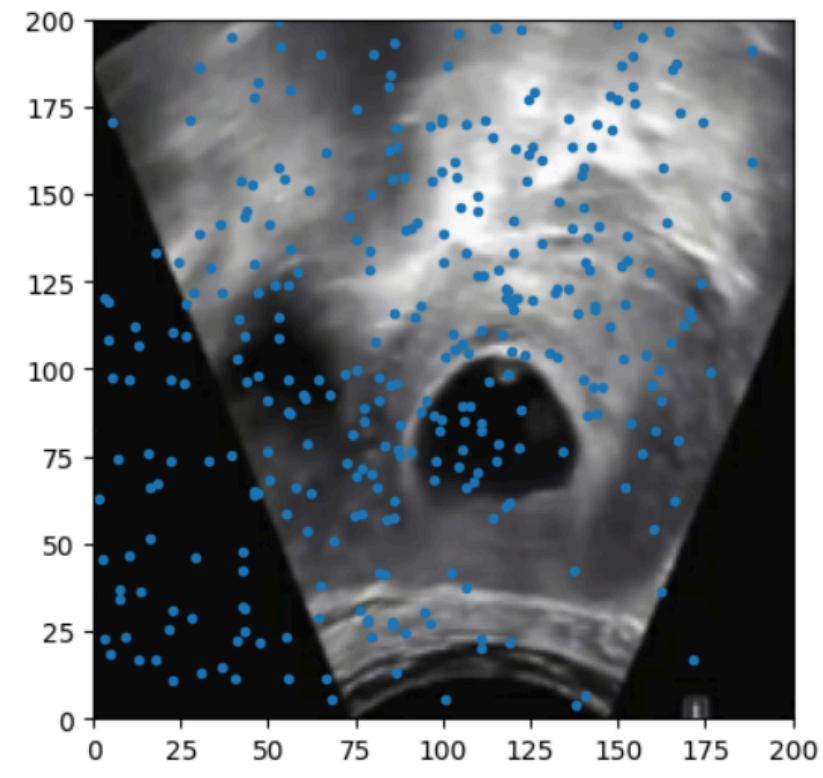
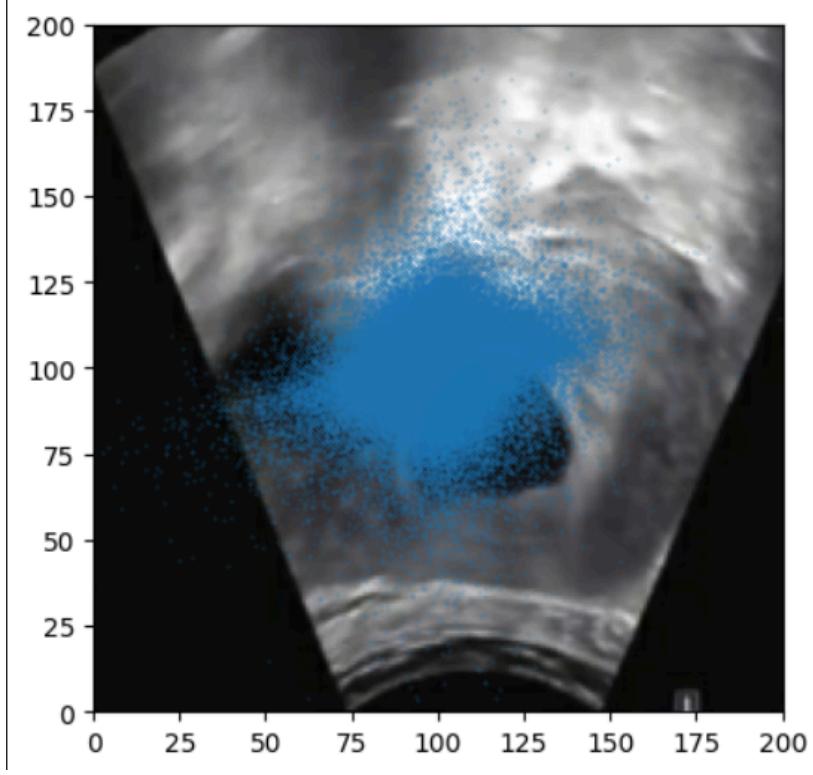
pco\_5.jpg





1image40.jpg





## Results on Testing Dataset

### Classification and Interpretability Plots

- The following are pictures of the top 5 frames selected from the testing dataset, along with interpretability plots:

Image name	Interpretability plot
image10002.jpg	

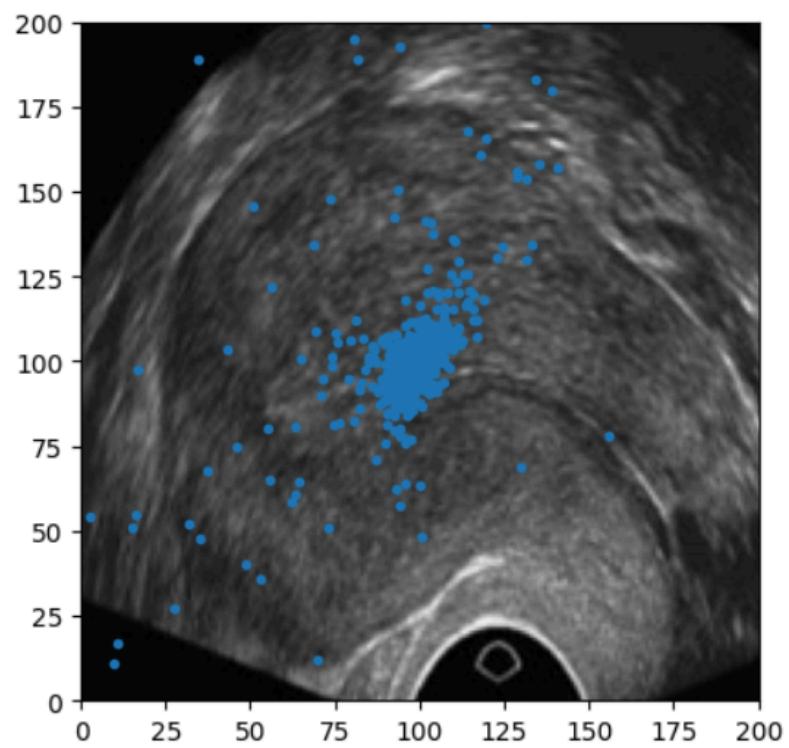
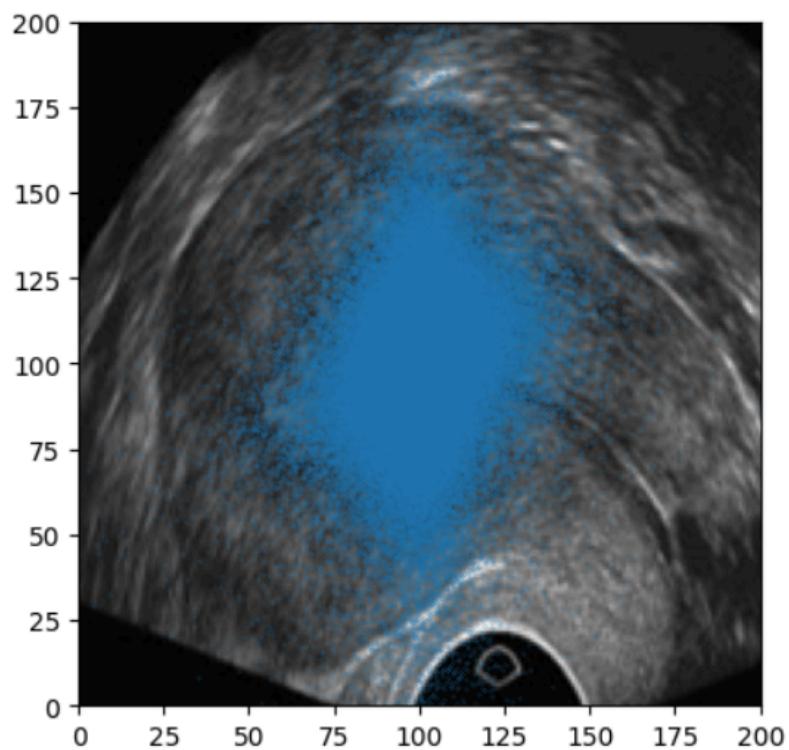
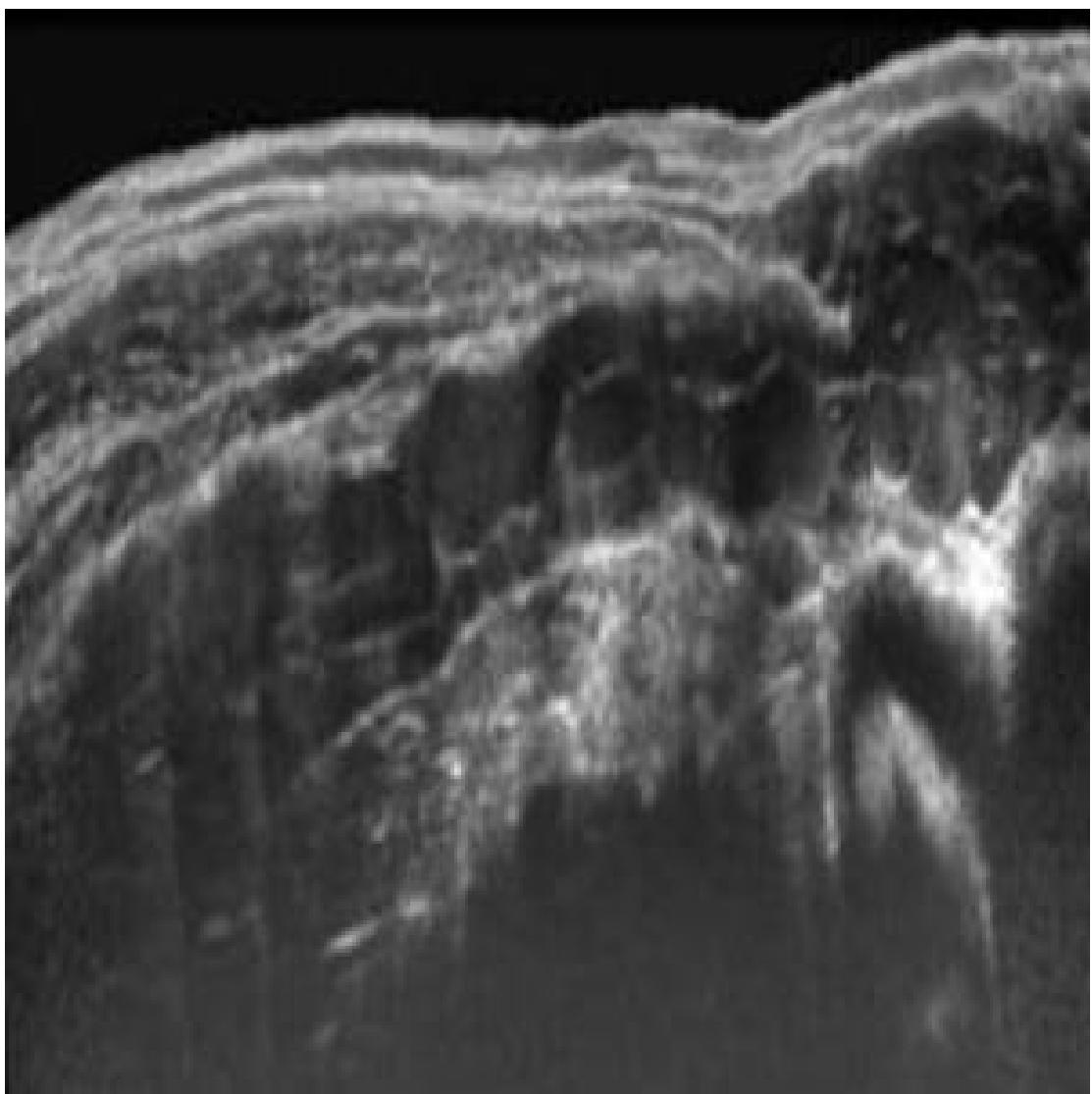


image10087.jpg



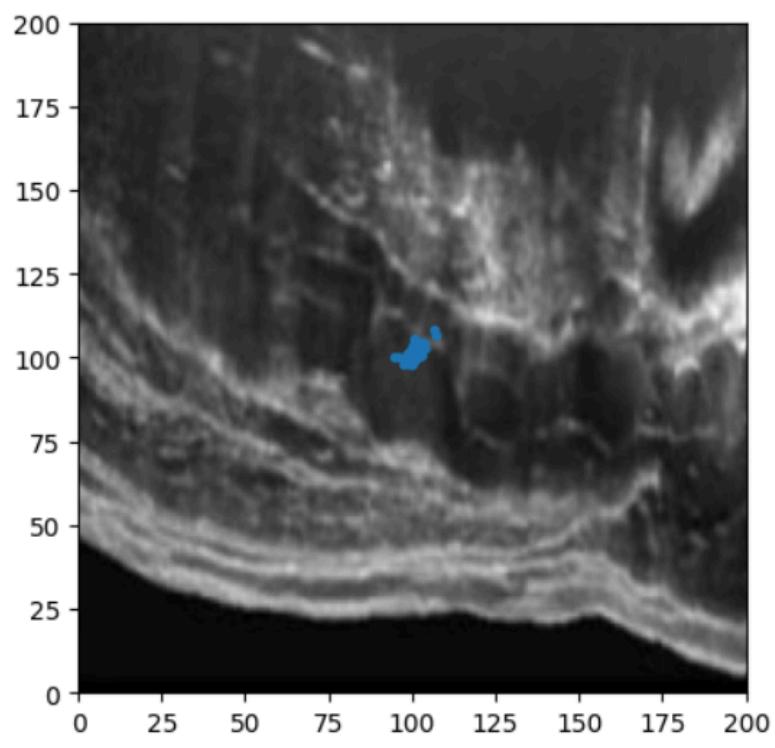
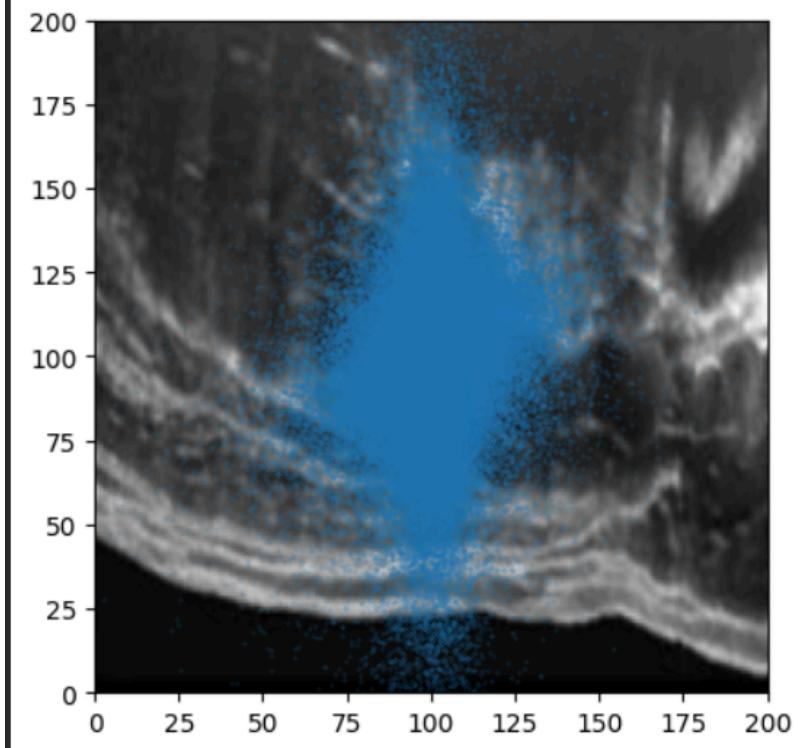
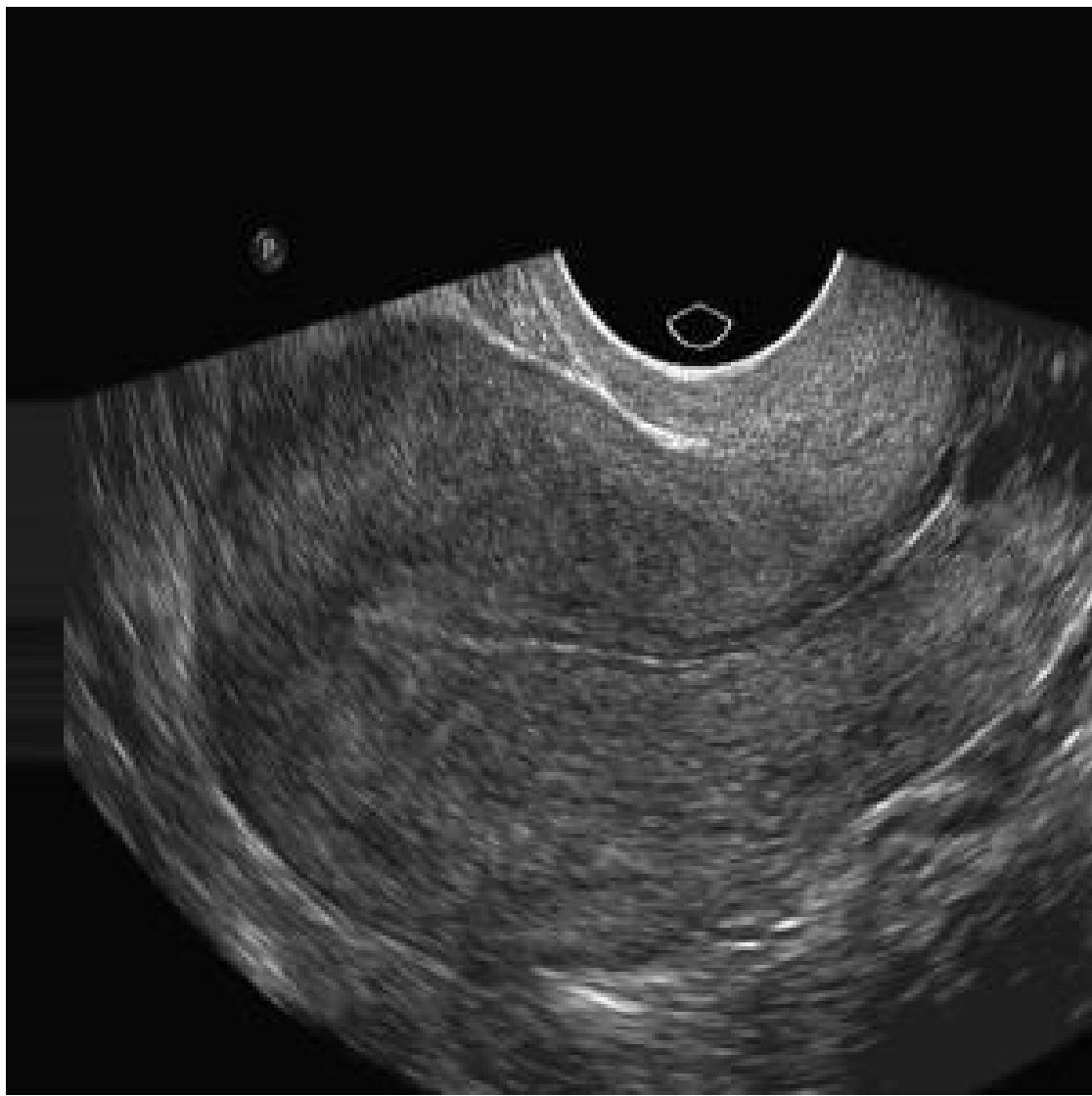


image10057.jpg



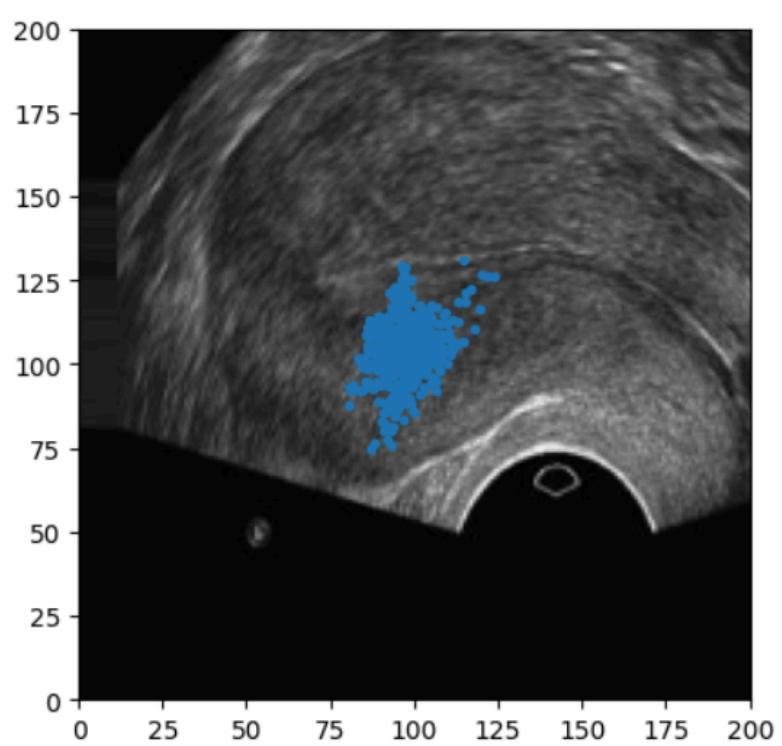
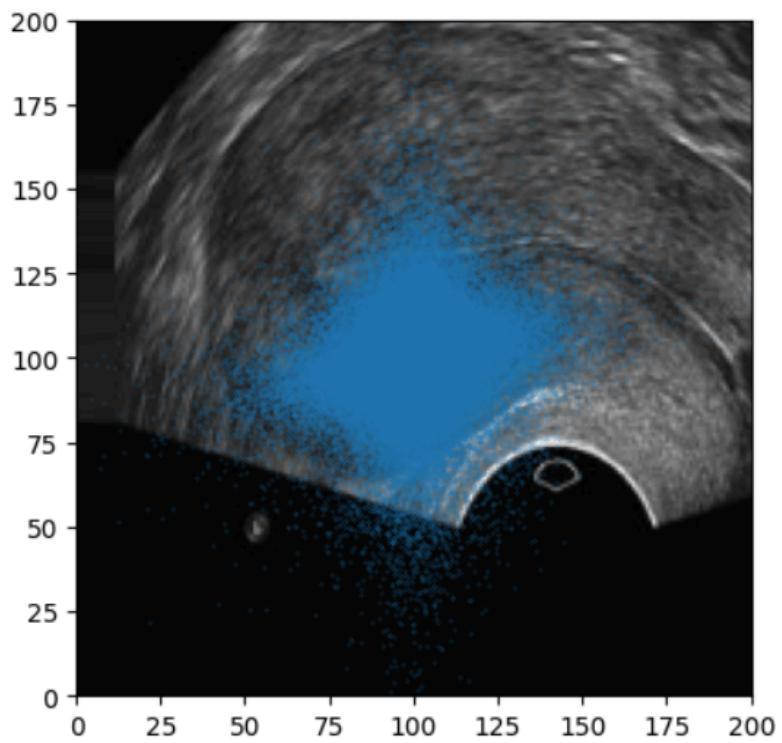


image10121.jpg



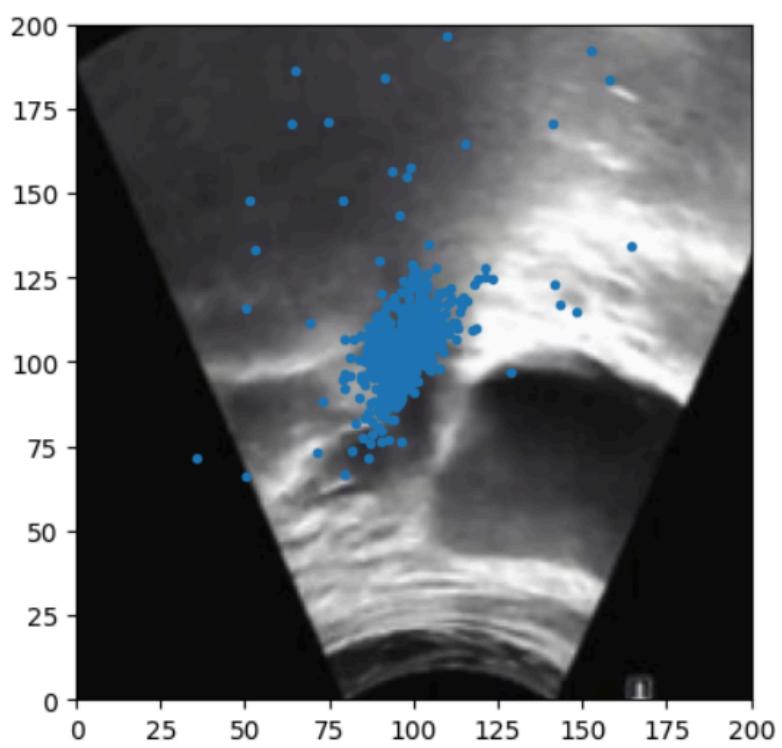
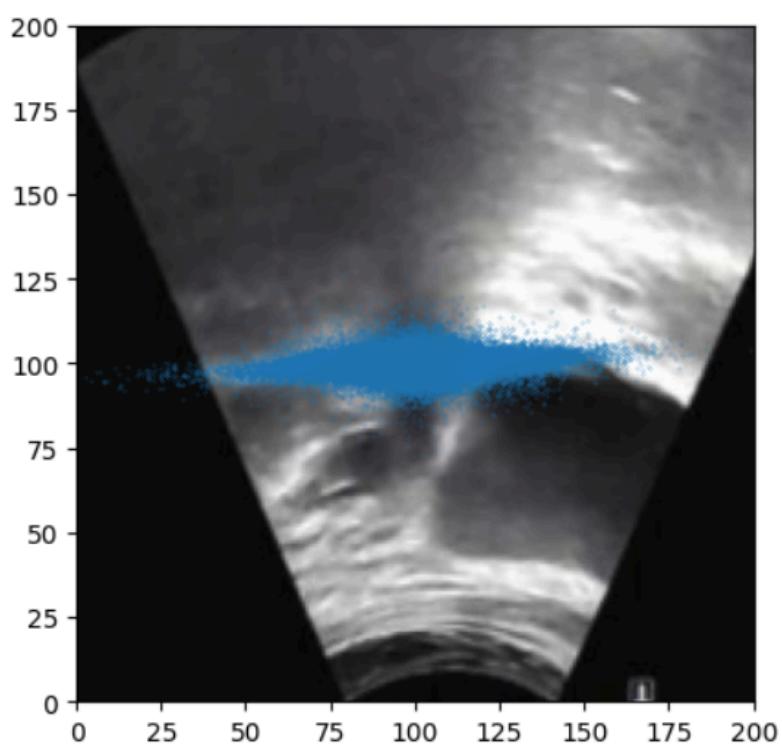


image10967.jpg



