



AIPI 540 – Computer Vision

# TREAT IT OR LEAVE IT?

Malignancy Diagnosis of  
Lesions from Clinical  
Dermatological Images

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## Presentation Outline

- Project Background
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# PROBLEM

Access to dermatology care is limited with an increasing gap between supply and demand.



# SOLUTION

A clinical decision support system!



A Clinical decision support system

**Upload a photo to know:  
Benign or Malignant?**



Click to upload an image



# **DATASET**

## **#ISIC2016**



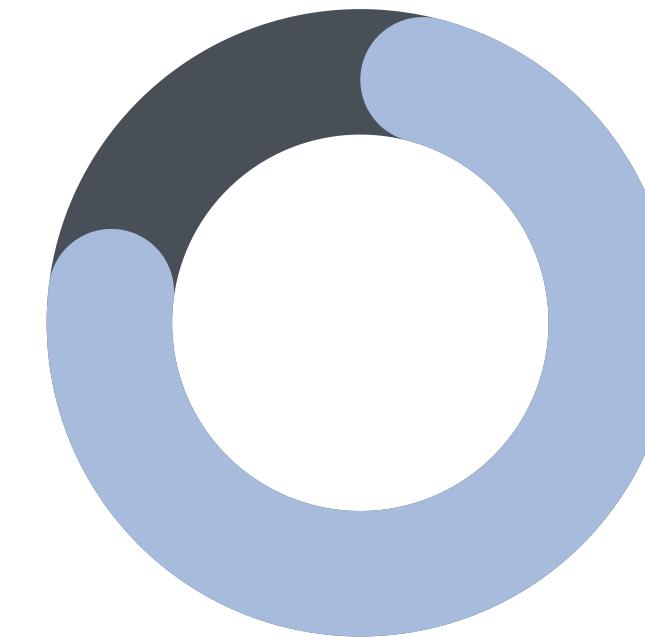
**900** dermoscopic lesion images in JPEG format

Testing: 30%



Training: 70%

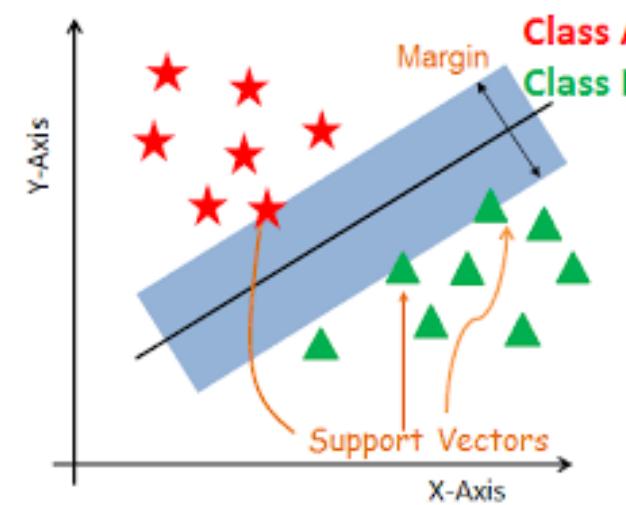
Malignant: 19%



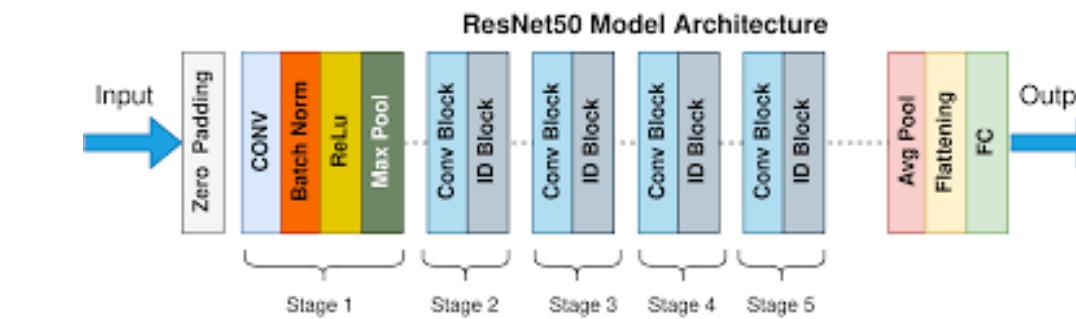
Benign: 81%



# METHODOLOGIES



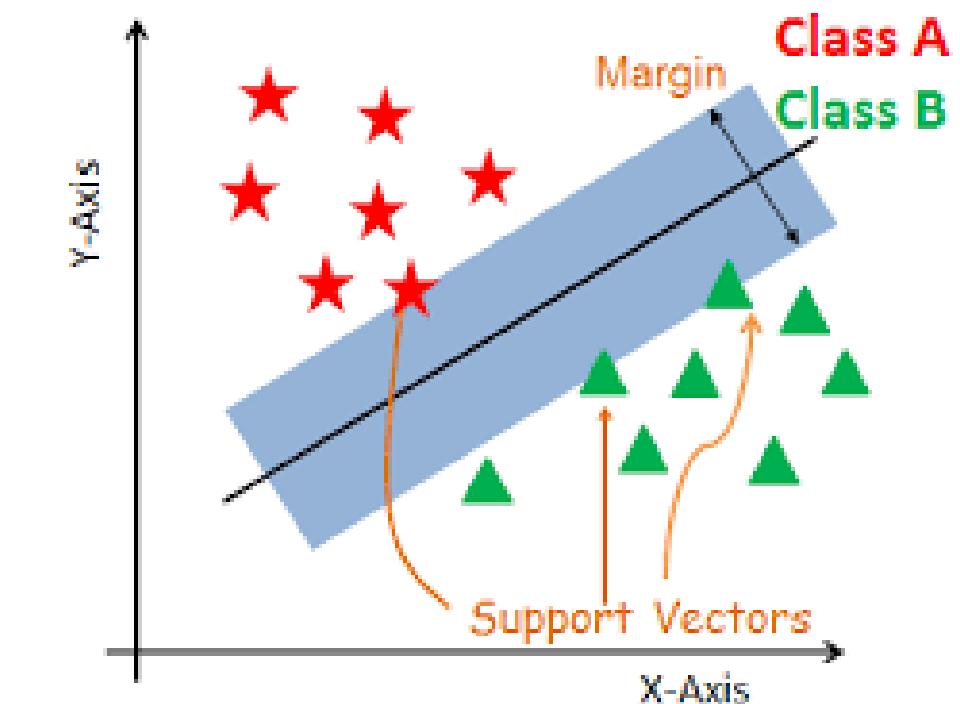
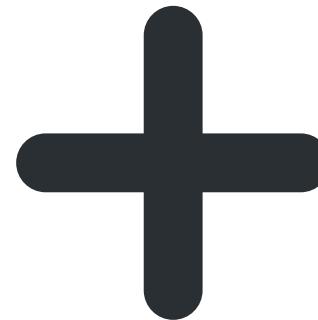
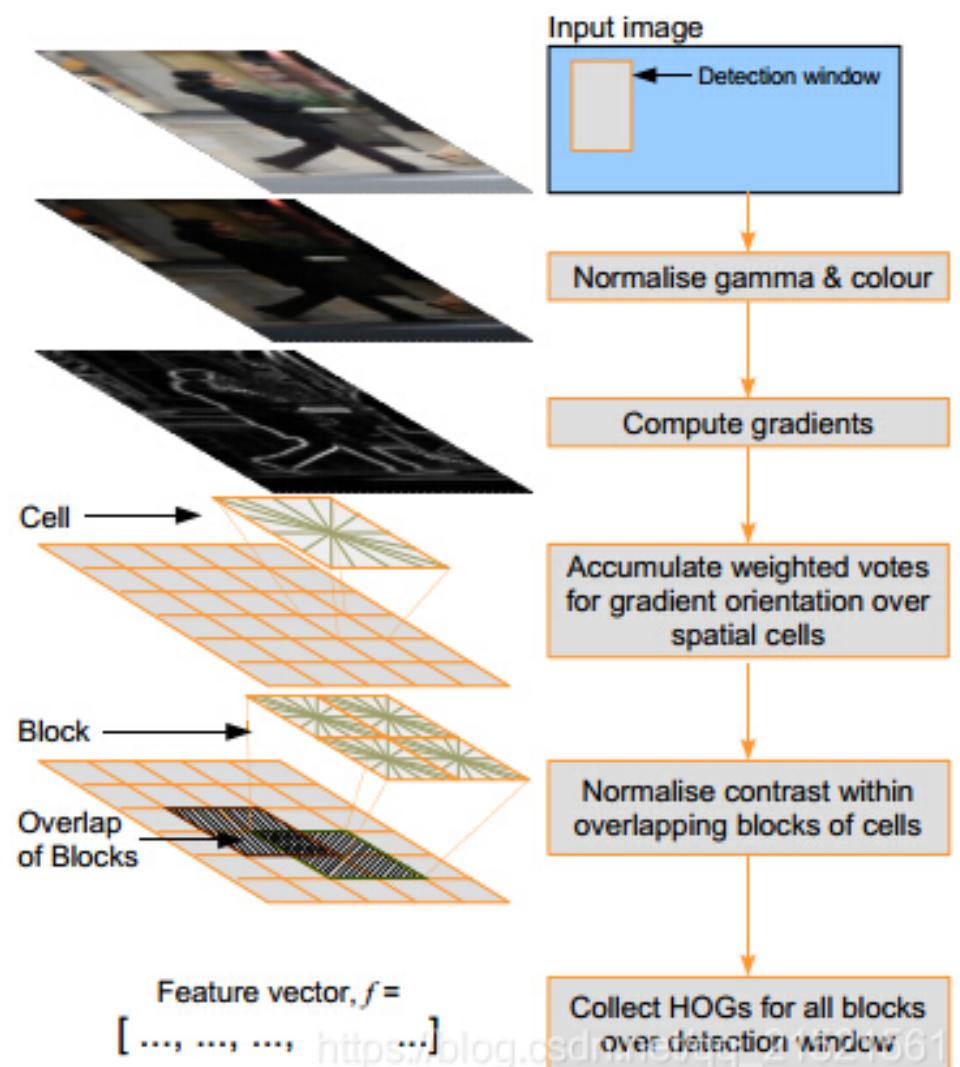
Support vector  
machine (SVM)



Convolutional neural  
network (CNN)

ResNet50

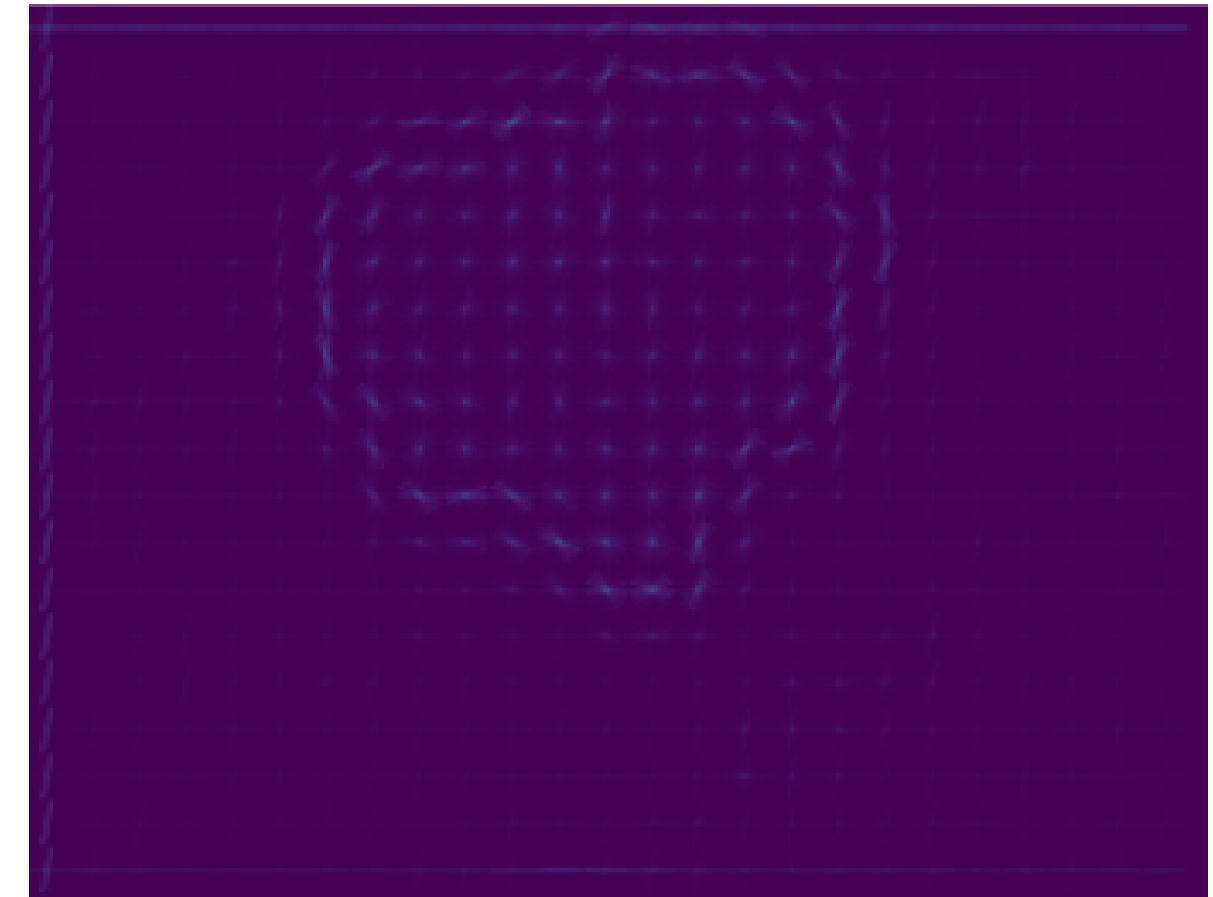
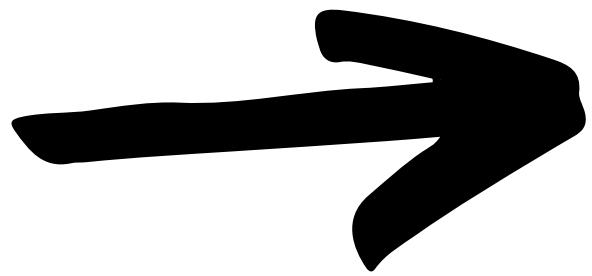
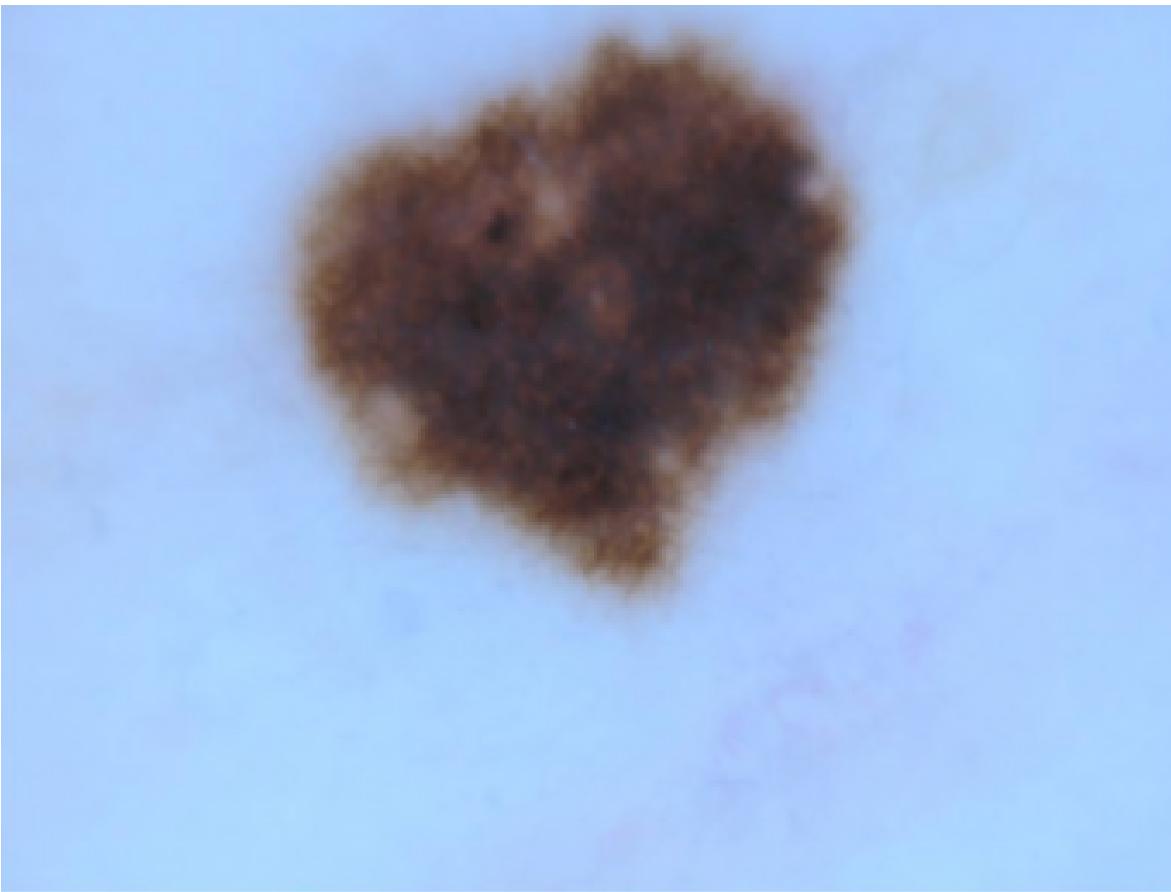
# NON-DL METHOD



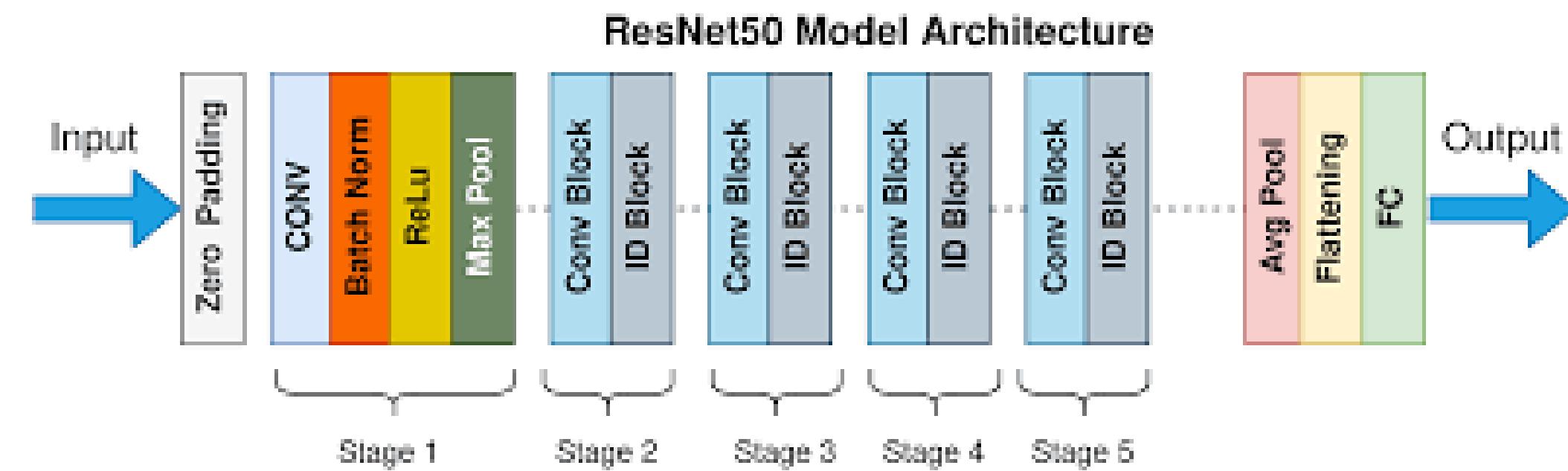
Histogram of Oriented  
Gradient (HOG)

Support Vector Machine  
(SVM)

# HISTOGRAM OF ORIENTED GRADIENT (HOG)



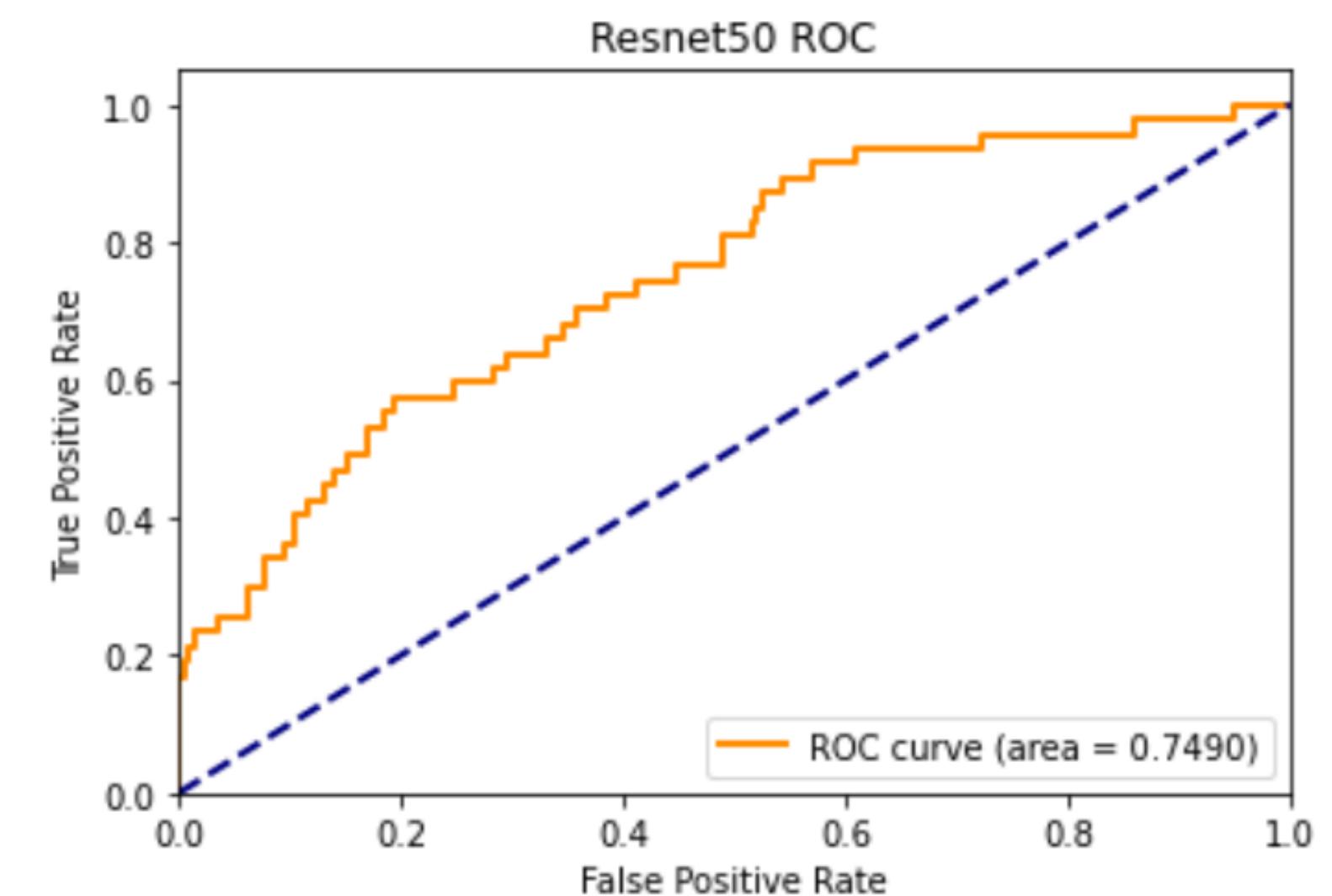
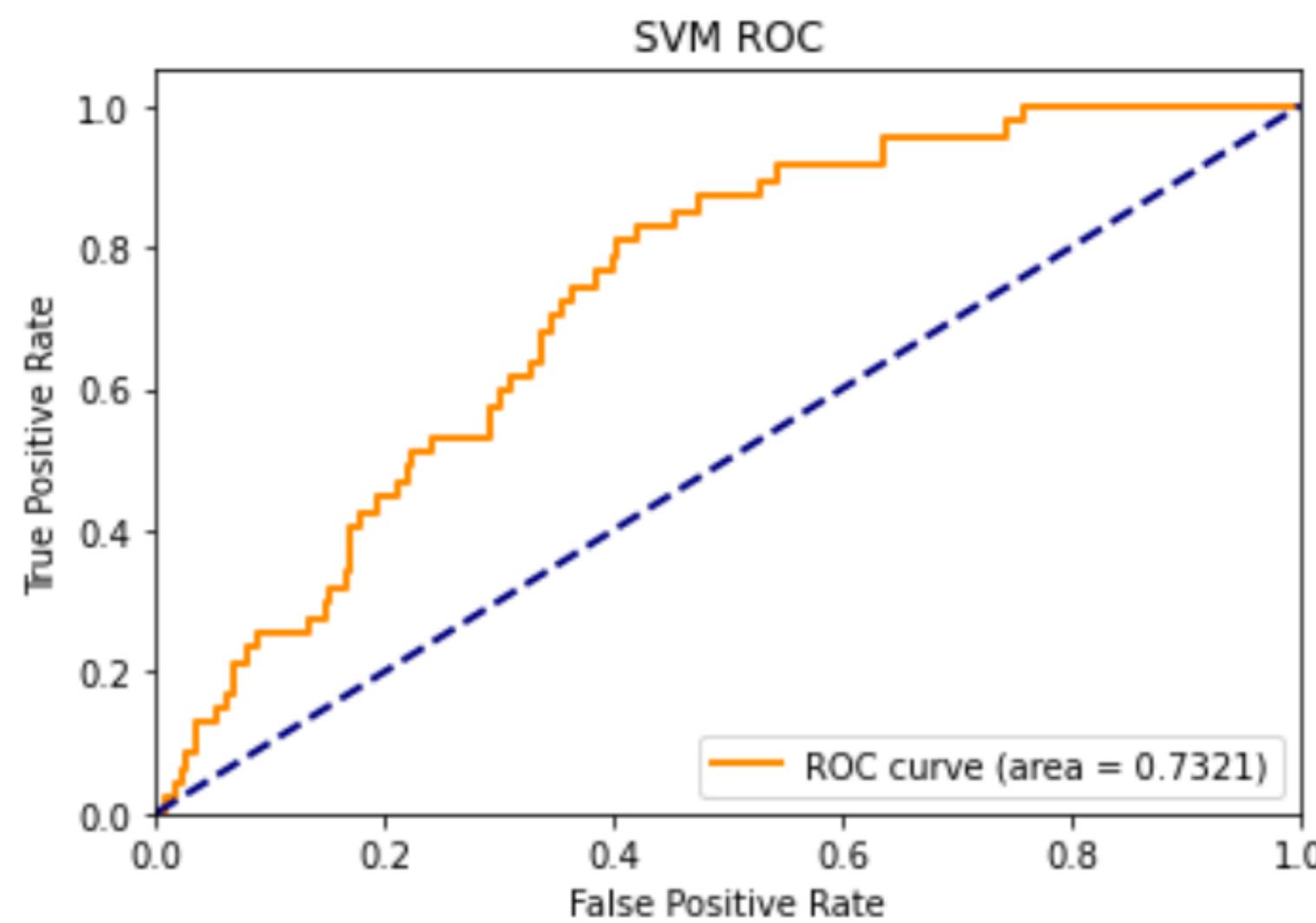
# DL METHOD



**Convolutional neural  
network (CNN)**

ResNet50

# NON-DL VS DL

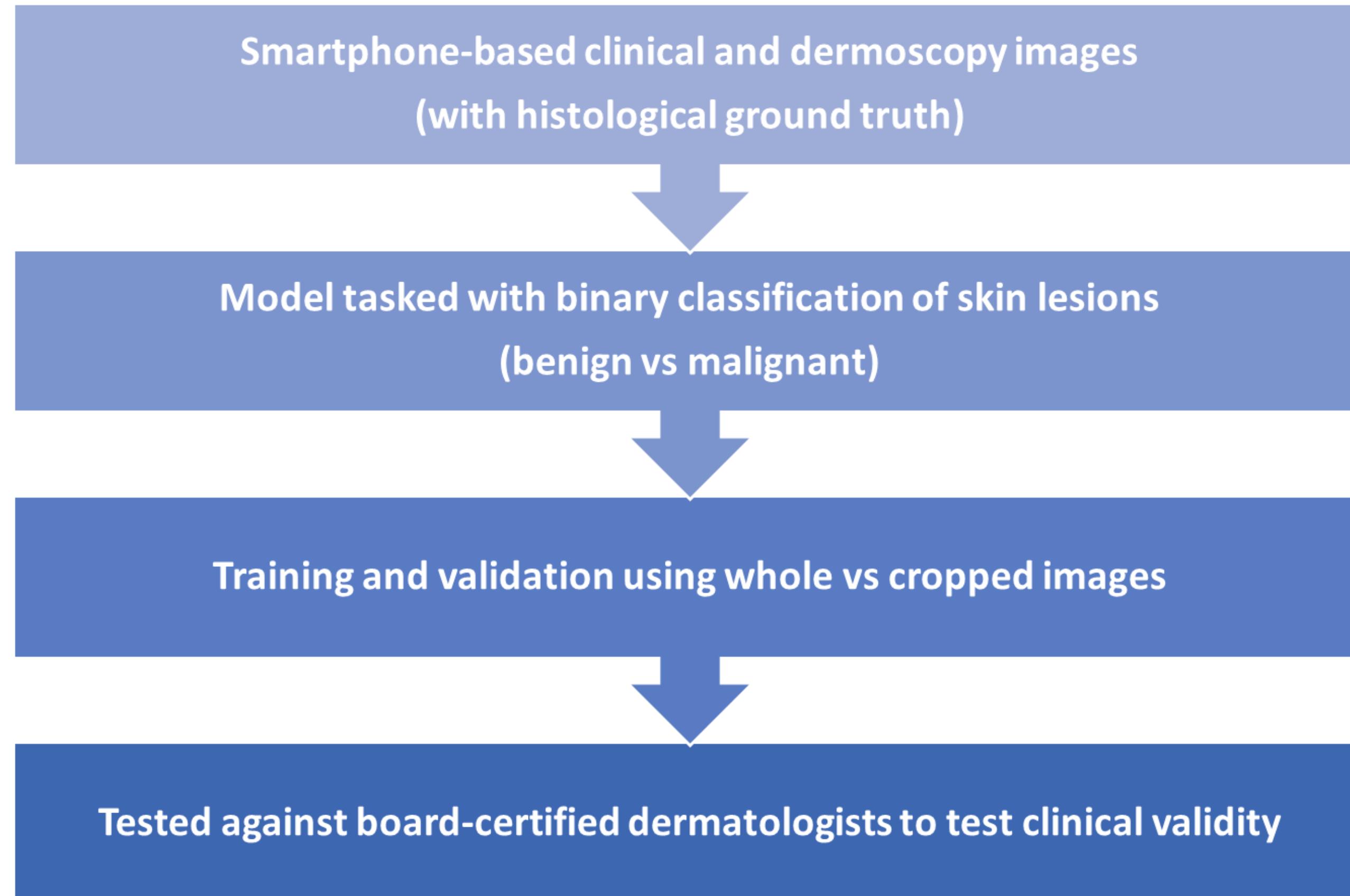


# OVERFITTING

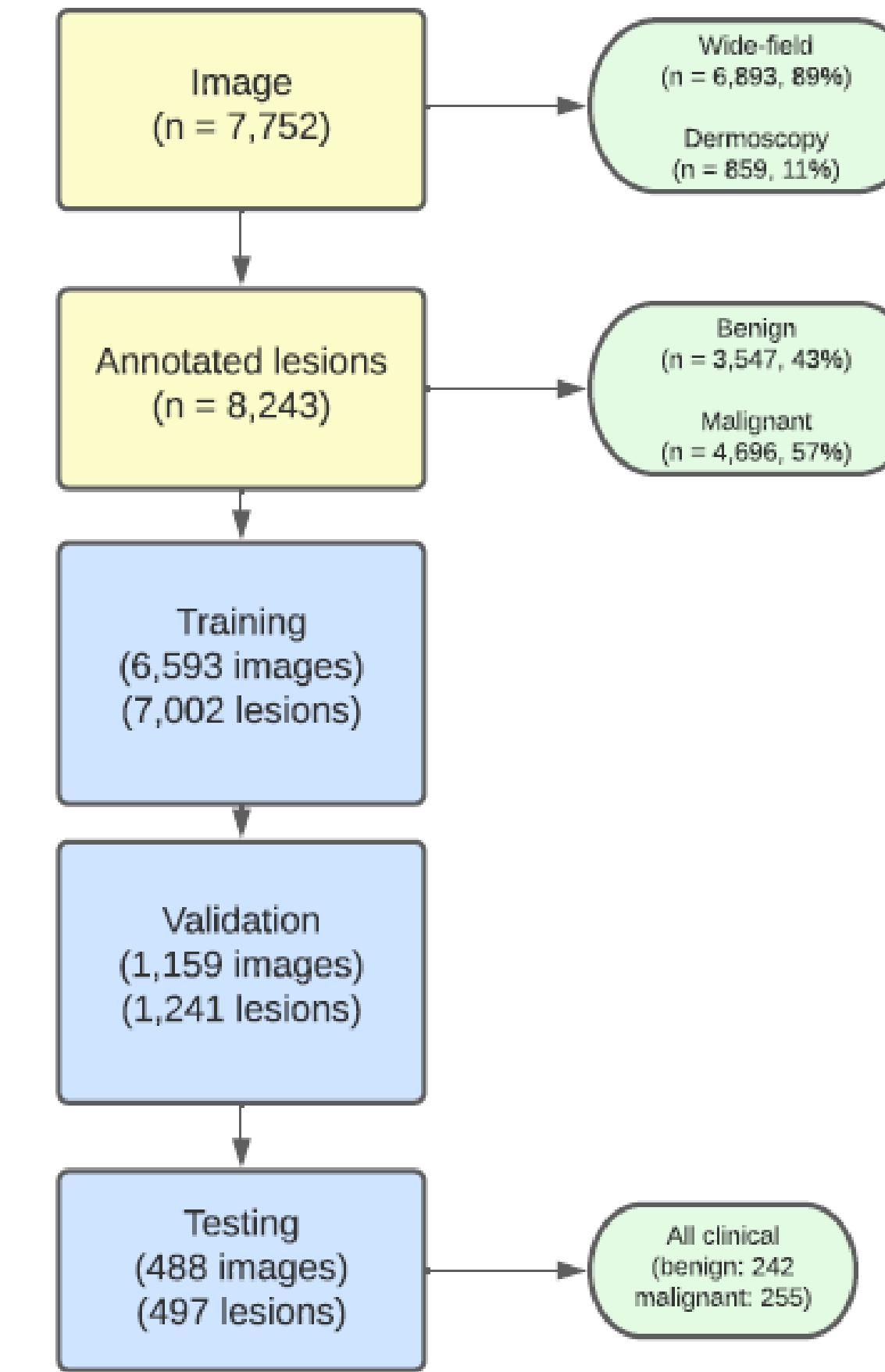
	precision	recall
0	1.00	0.99
1	0.95	1.00

	precision	recall
0	0.85	0.88
1	0.32	0.26

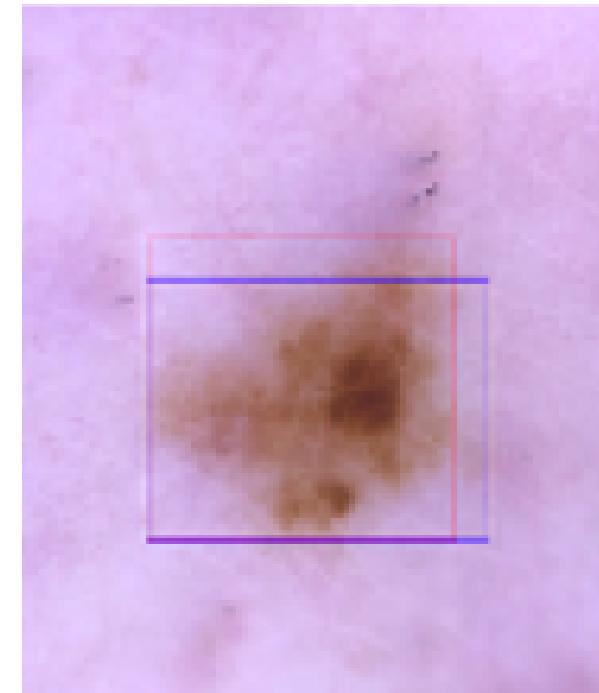
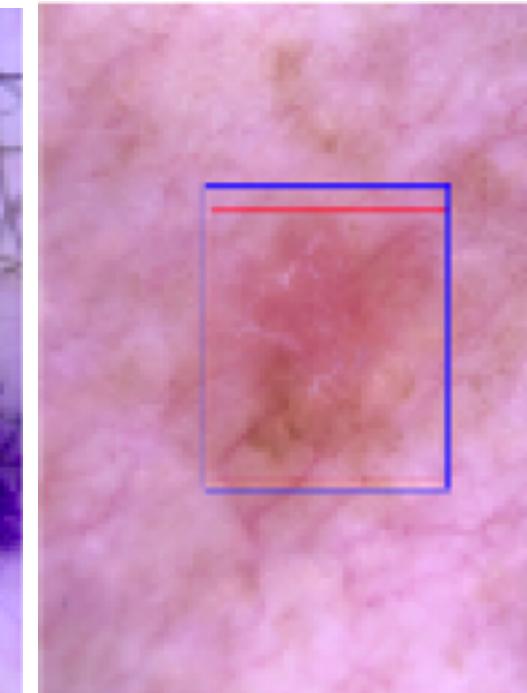
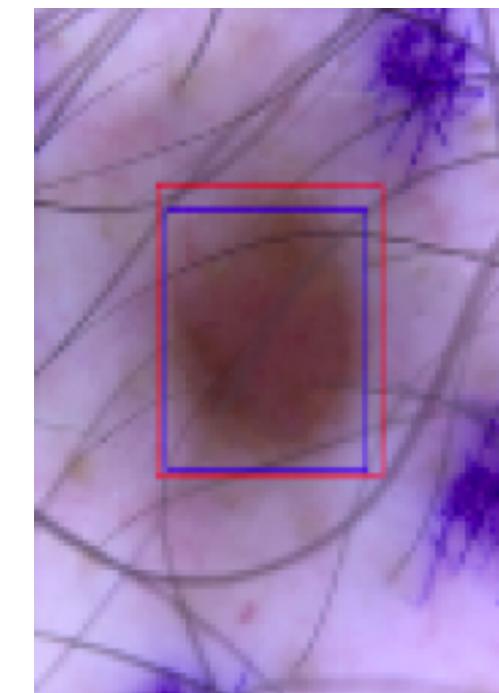
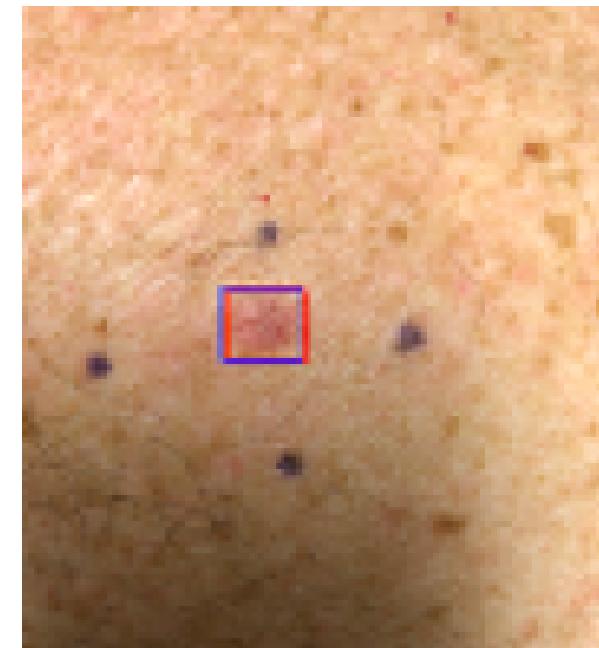
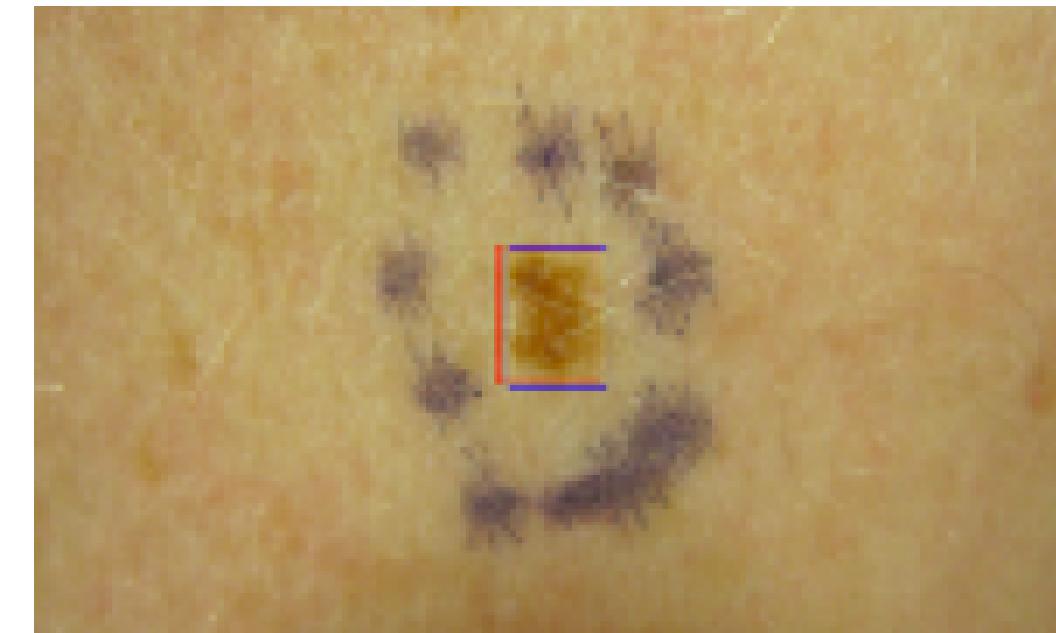
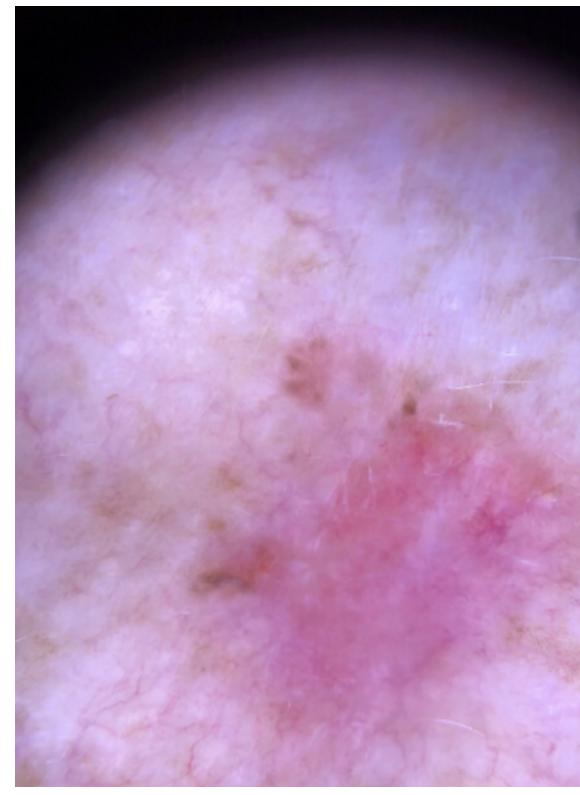
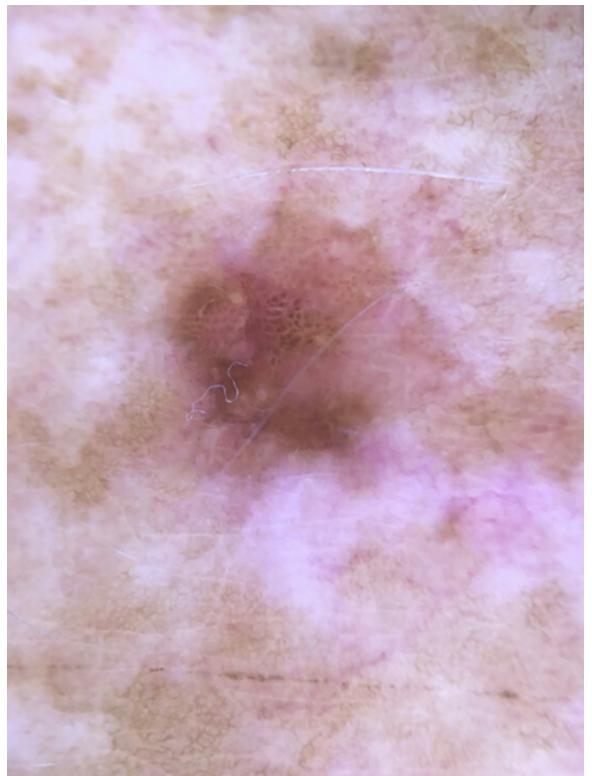
# MODEL AND DATAFLOW DETAILS



# DATASET #DUKE



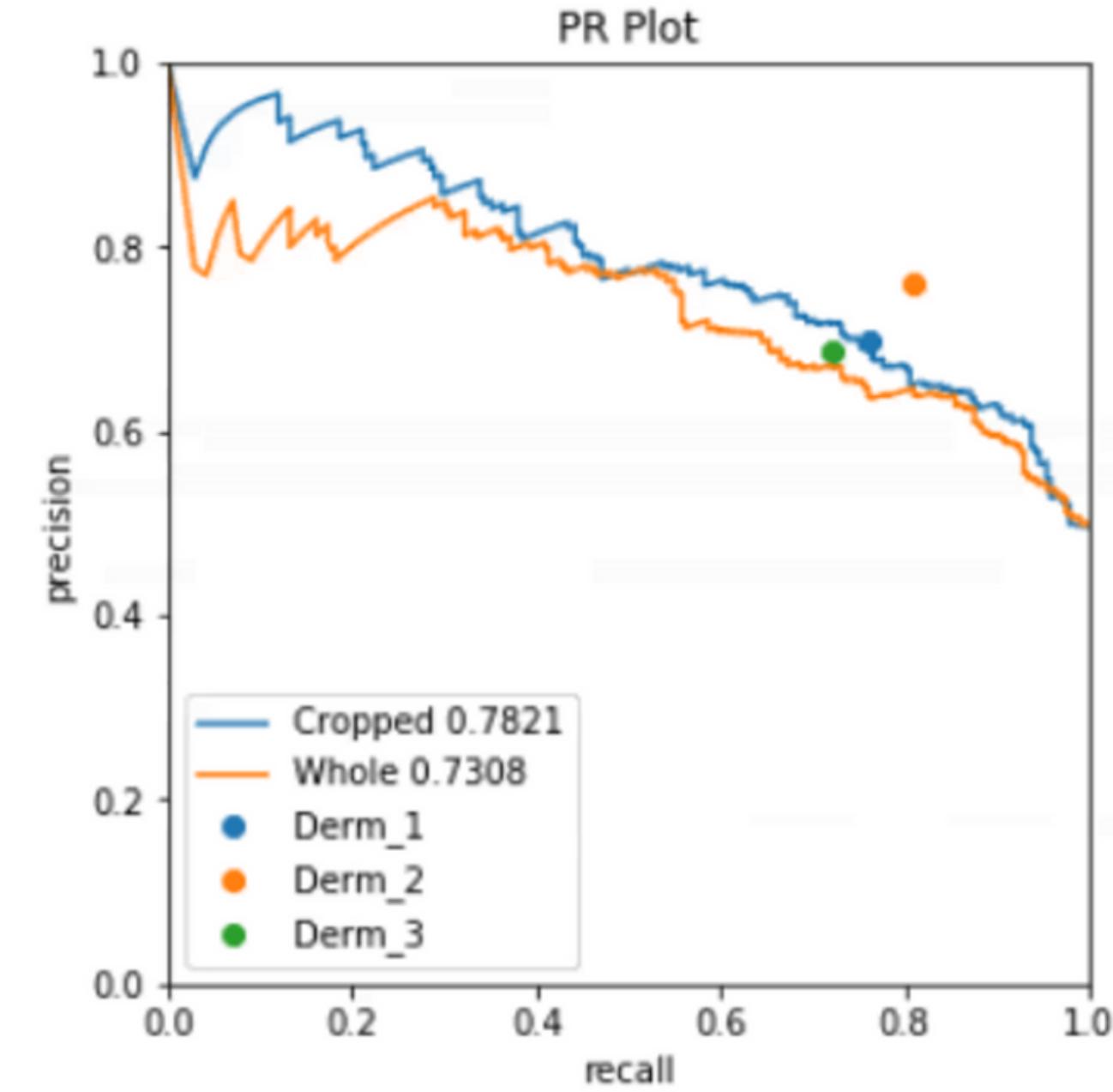
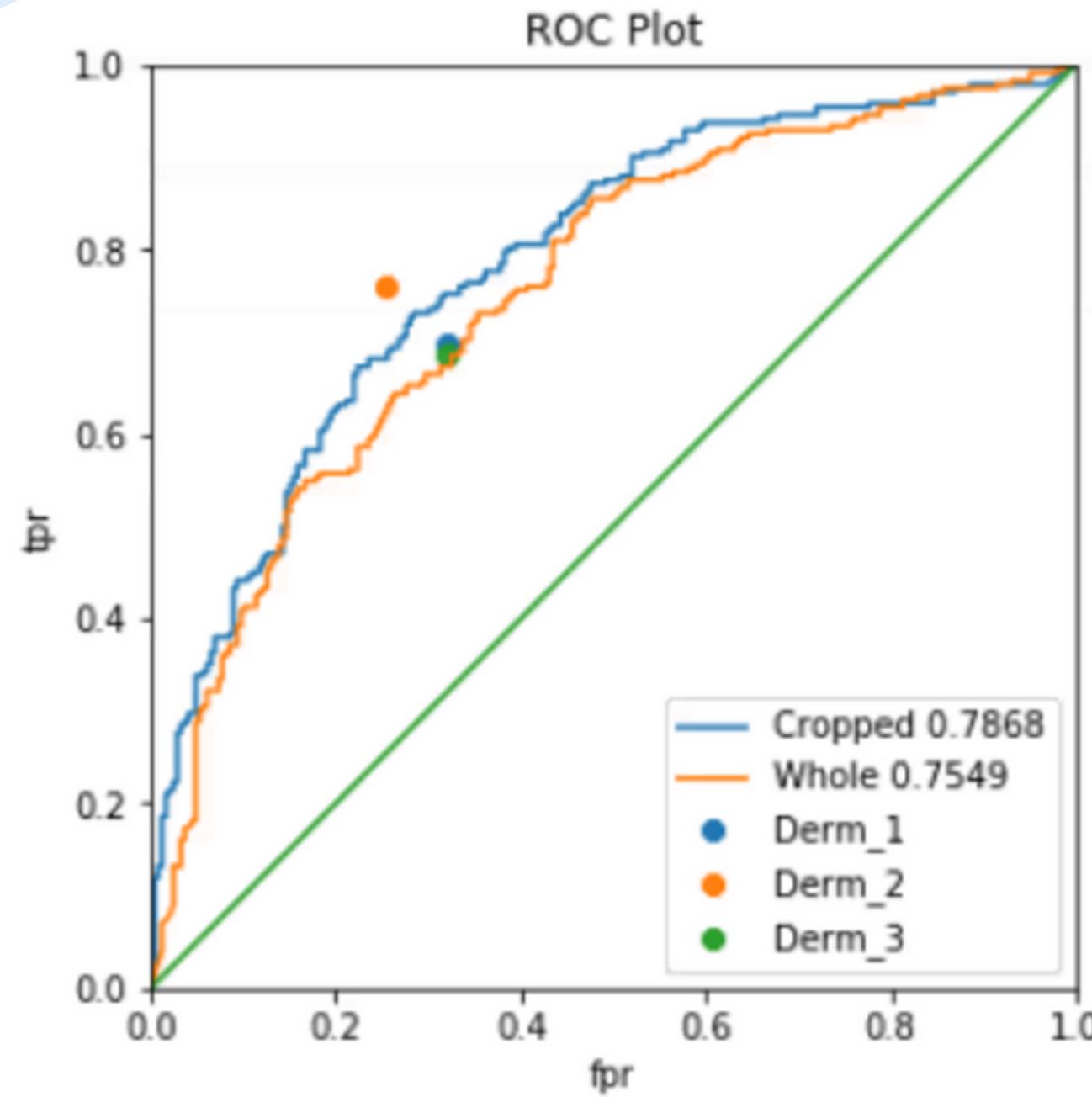
# WHOLE IMAGES CROPPED IMAGES



- Average area of lesion =  $2683 \times 2683$  pixels in size

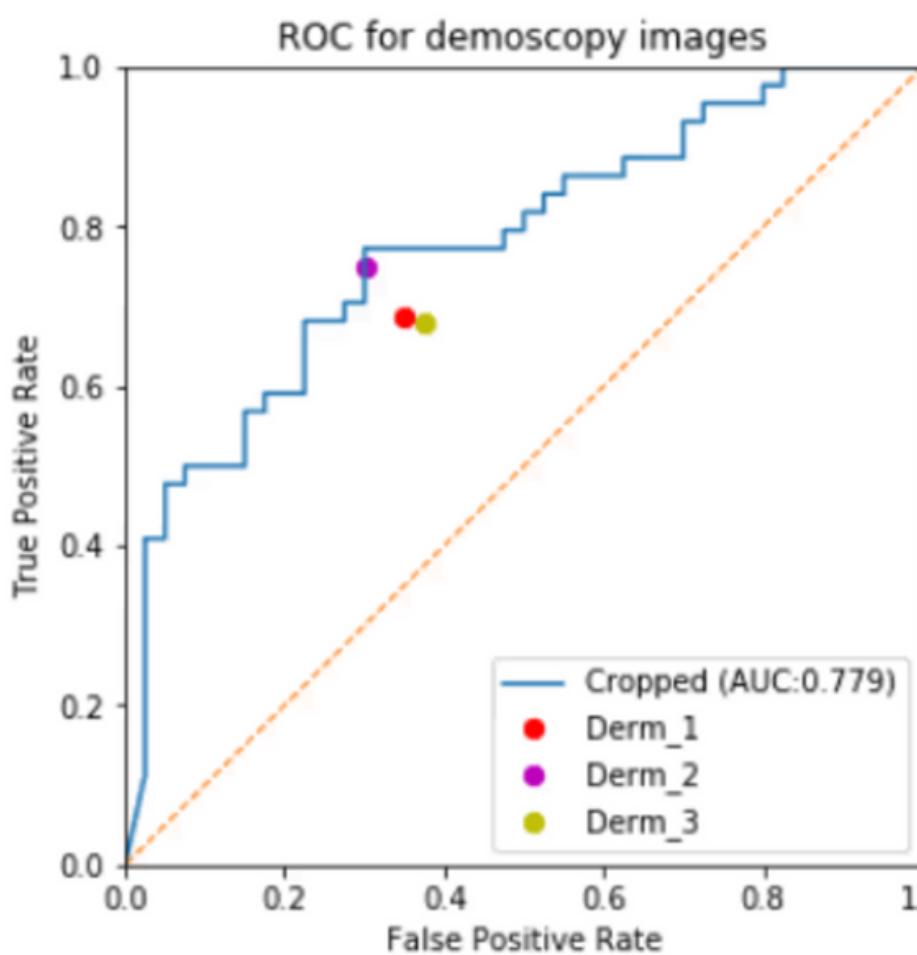
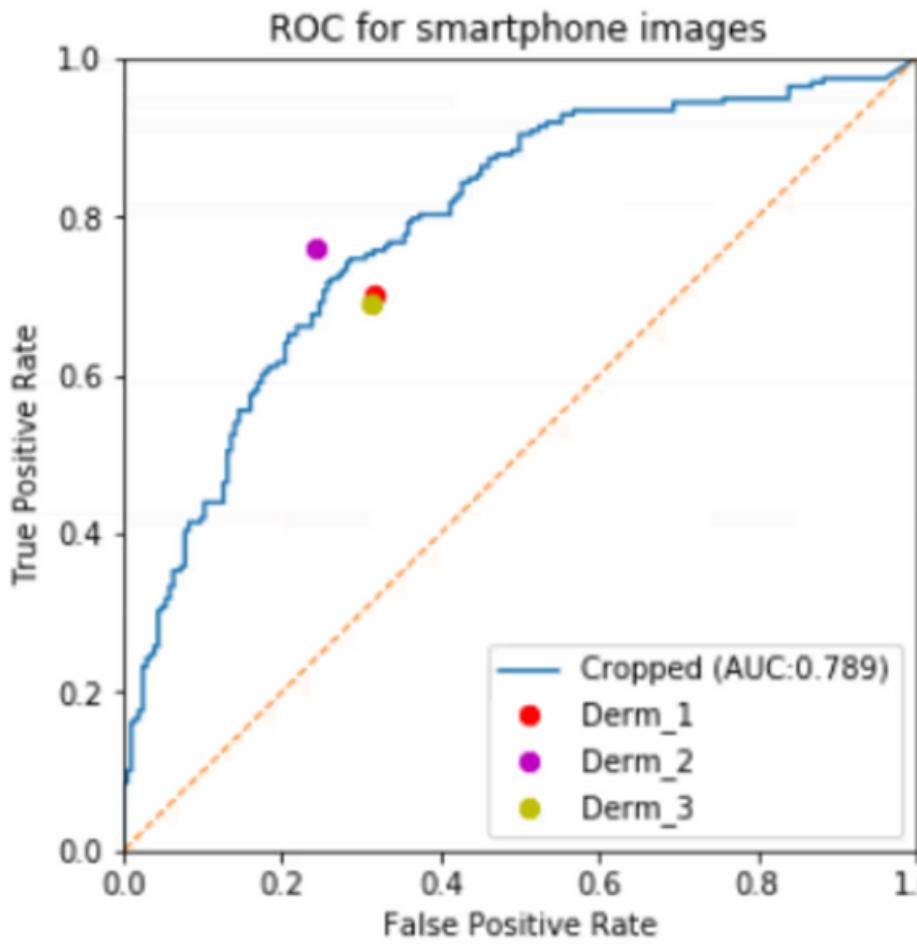
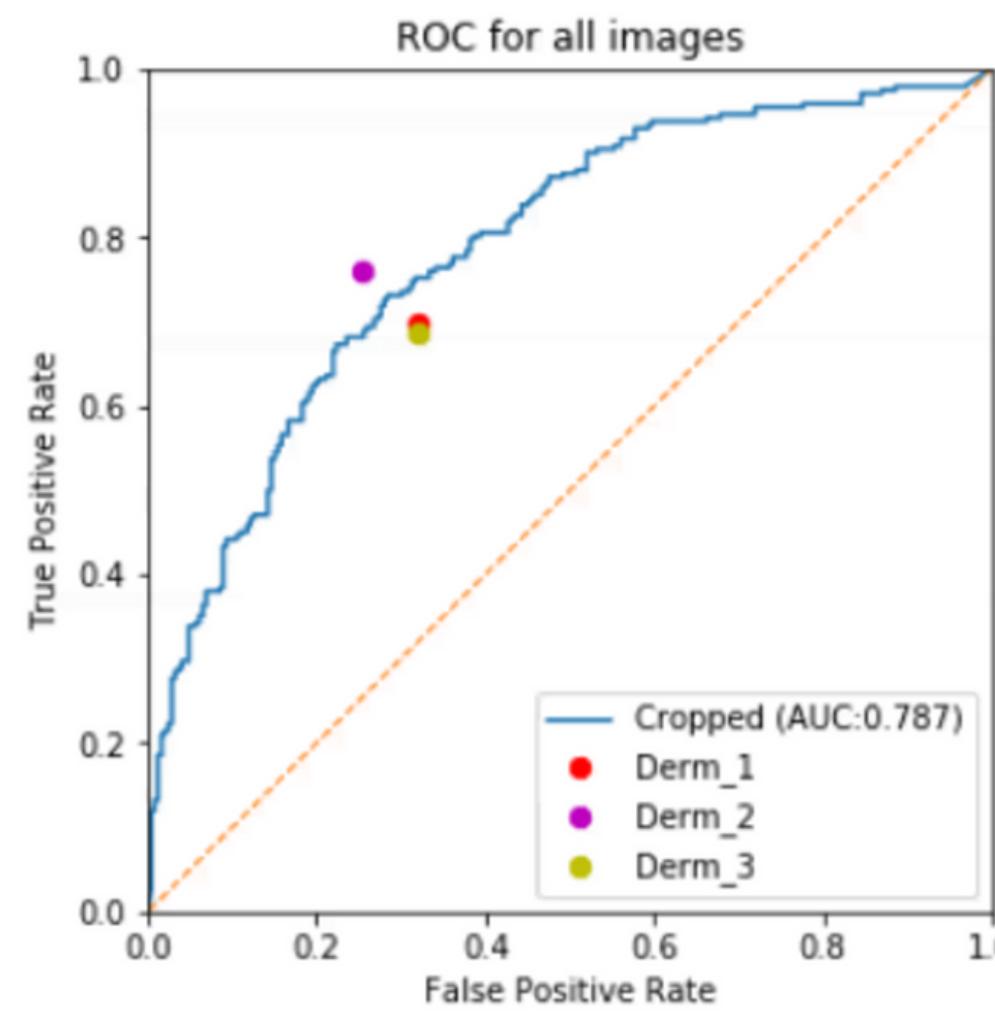
- Used the [Faster-RCNN model](#) developed by Facebook AI to make bounding boxes (blue) around lesion of interest
- Used [manual annotations \(red\)](#) as ground truth
- Average area of lesion =  $120 \times 120$  pixels in size

# RESULTS

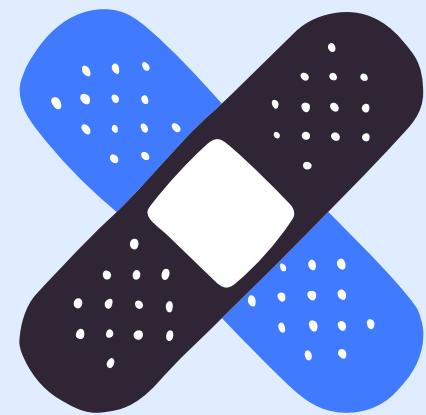


- Lesion prediction on cropped images demonstrate better results than whole images
- Model and dermatologists demonstrate similar success in lesion classification

# RESULTS



Similar accuracy when used on clinical smartphone images vs dermoscopy images



# Summary

HOG+SVM performs similar to Resnet50 on ISIC2016 dataset

Model and dermatologists demonstrate similar success in lesion classification

Lesion prediction on cropped images demonstrate better results than whole images

Similar accuracy when used on clinical smartphone images vs dermoscopy images



**THANK YOU  
FOR  
LISTENING!**