Classifying Skin Lesions In Dermoscopic Images Using Neural Networks

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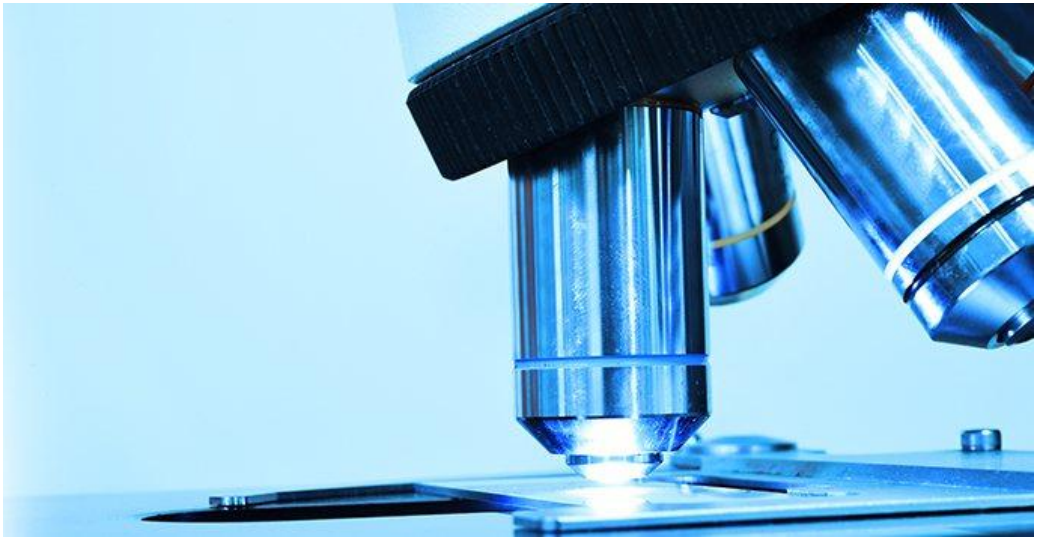
Presentation Outline

- Business Understanding
- Purpose Of Analysis
- Data & Methods
- Results
- Recommendations
- Next Steps



https://ocskinlab.com/dermatopathology/

https://medivizor.com/blog/2016/05/03/can-spot-skin-cancer/

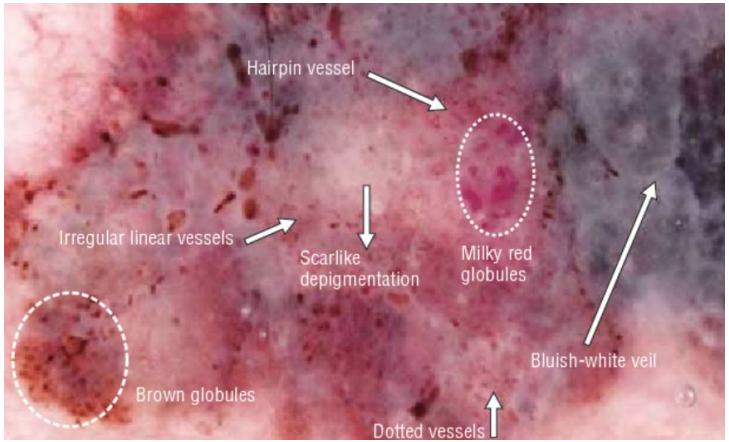
Business Understanding

Background:

Skin cancer is the most common form of cancer in the United States and worldwide

Diagnosis:

- Clinical methods
- Biopsy under a microscope



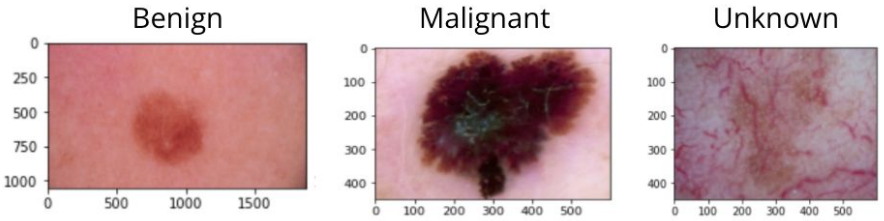
https://www.semanticscholar.org/paper/Dermoscopy-and-the-diagnostic-challenge-of-and-Stoecker-Stolz/

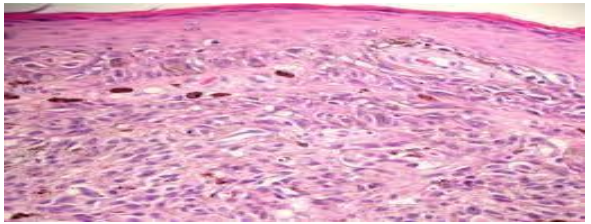
Purpose Of Analysis

Predict whether skin lesions in dermoscopic images are benign, malignant, or of unknown risk

Stakeholder: Health-tech startup

Key Metric: F1 Score





https://dermnetnz.org/topics/melanoma-pathology

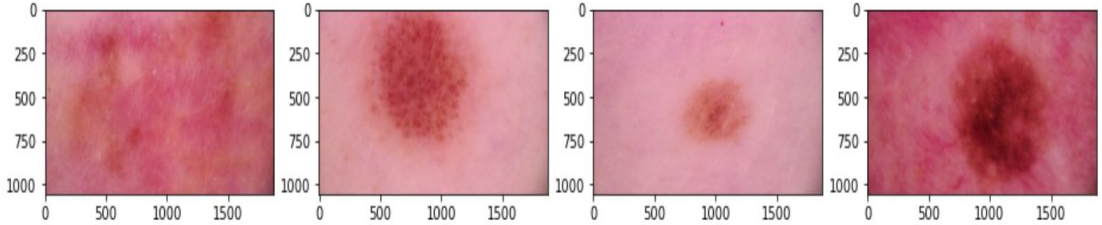
Data & Methods

Data provided by the International Skin Imaging Collaboration archive

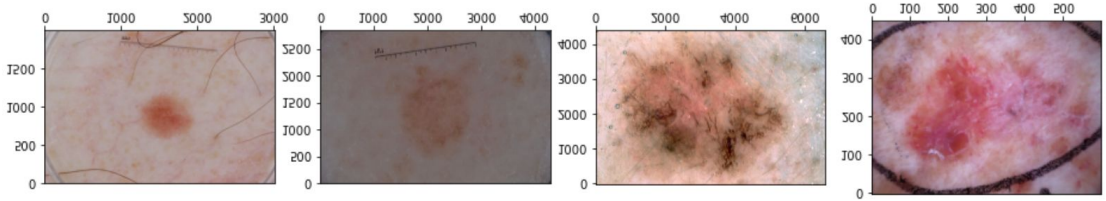
Number of Images: 7,179

Data Examples

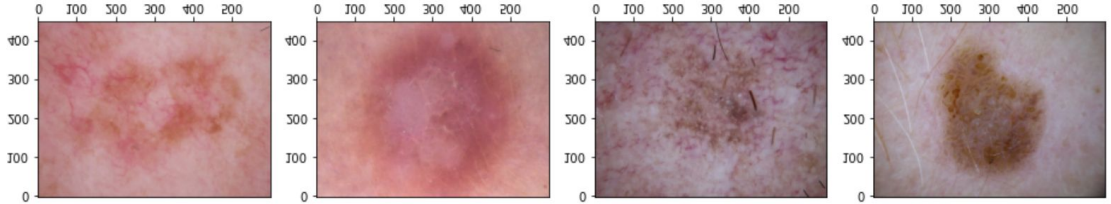
Benign:



Malignant:



Unknown:

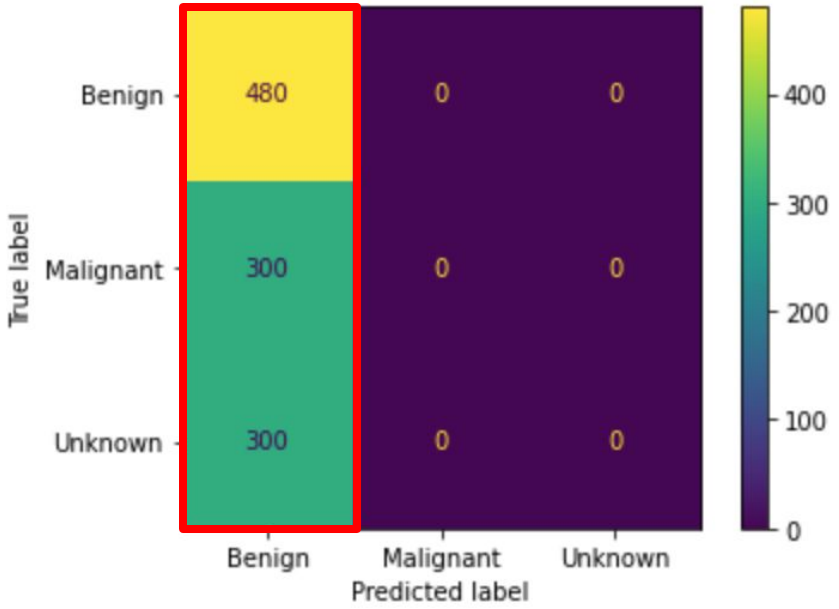


First Simple Model

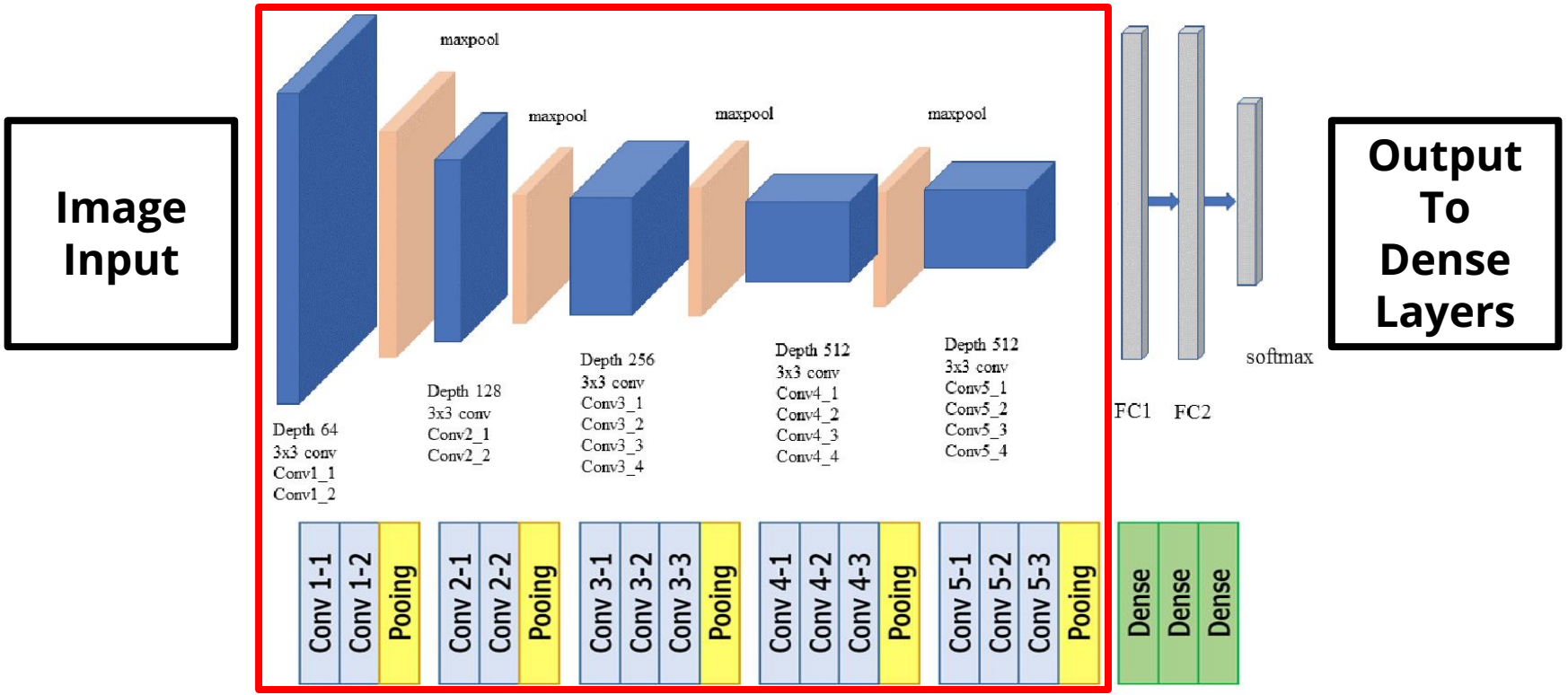
Fully Connected Dense Neural Network

- 2 hidden layers
- 1 output layer
- 5 epochs

Validation Accuracy: 44.44%

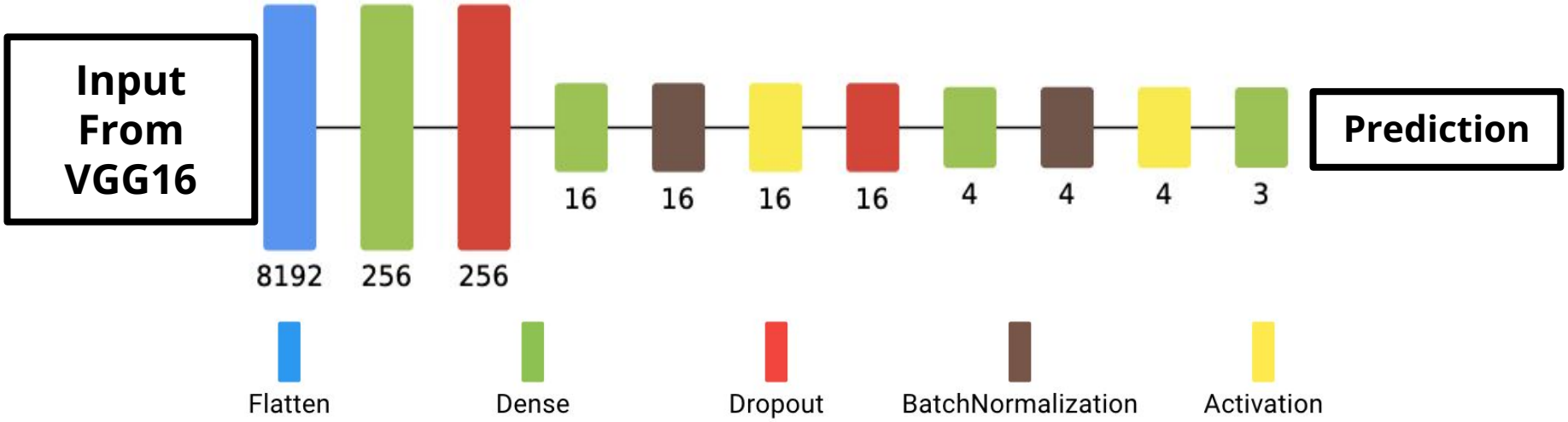


VGG16 Model Architecture



https://towardsdatascience.com/extract-features-visualize-filters-and-feature-maps-in-vgg16-and-vgg19-cnn-models-d2da6333edd0 | https://www.projectpro.io/article/deep-learning-for-image-classification-in-python-with-cnn/418

Dense Layer Architecture



https://arxiv.org/abs/1902.04394

Final Model

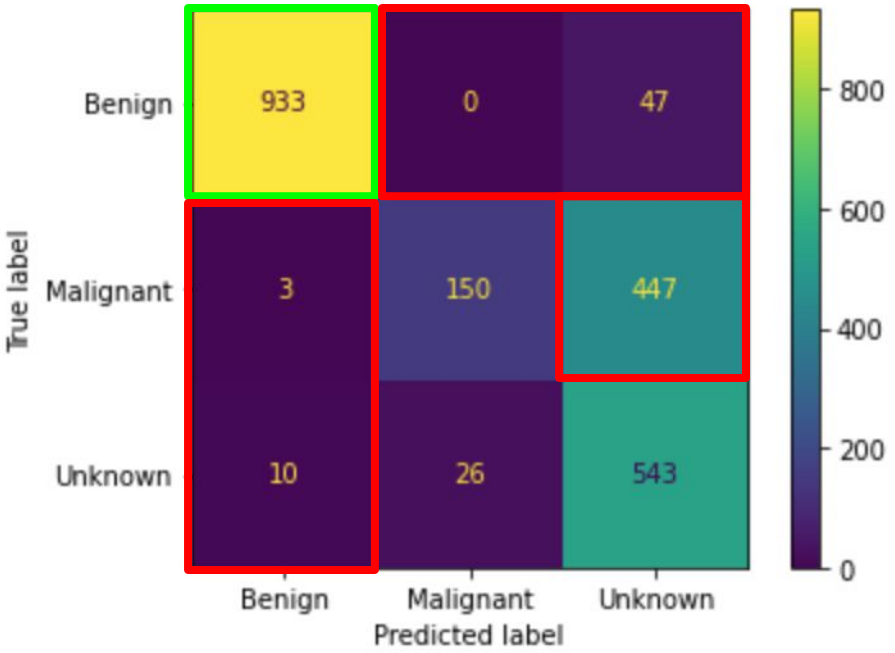
Convolutional Neural Network

- 25 epochs

Testing Set F1 Score: 96.88

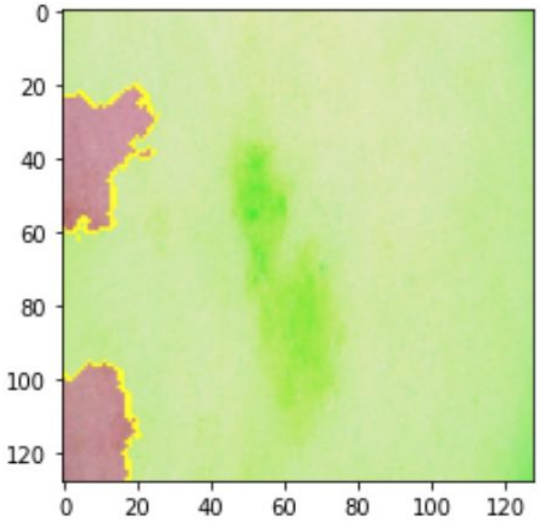
Benign Precision – 98.63%

Benign Recall – 95.20%

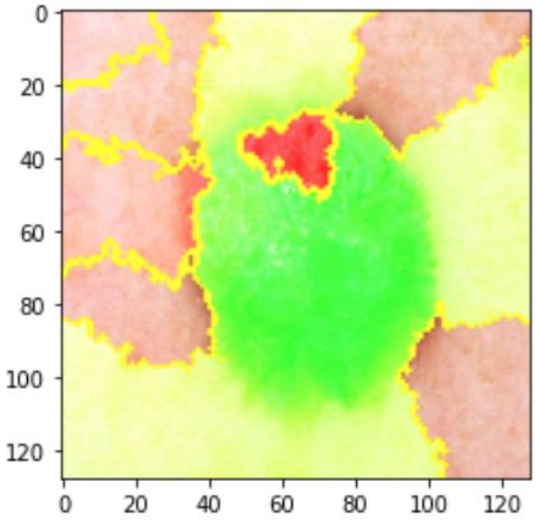


What Does The Model See?

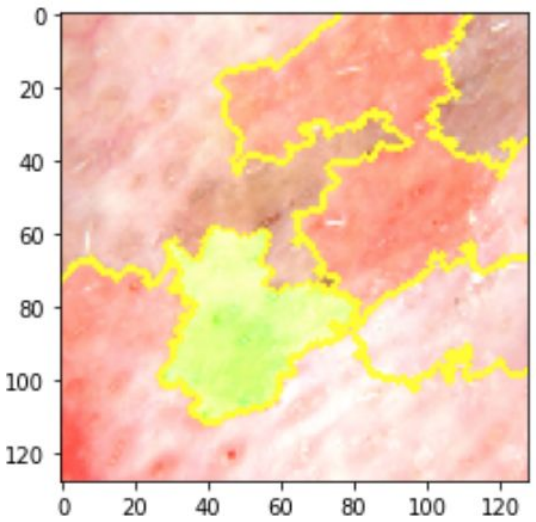
Correctly Classified Benign Lesion



Correctly Classified Malignant Lesion



Correctly Classified Unknown Lesion



Recommendations

Use this model as part of the clinical diagnosis of skin lesions

Use this model to reduce the number of biopsies taken of benign lesions that are misdiagnosed as being suspicious for malignancy

Next Steps

Get more dermoscopic images of those specific types of skin lesions that are underrepresented in the archive

Train a multiclass classifier that predicts specific types of lesions, such as melanoma, basal cell carcinoma, and squamous cell carcinoma

Thank You

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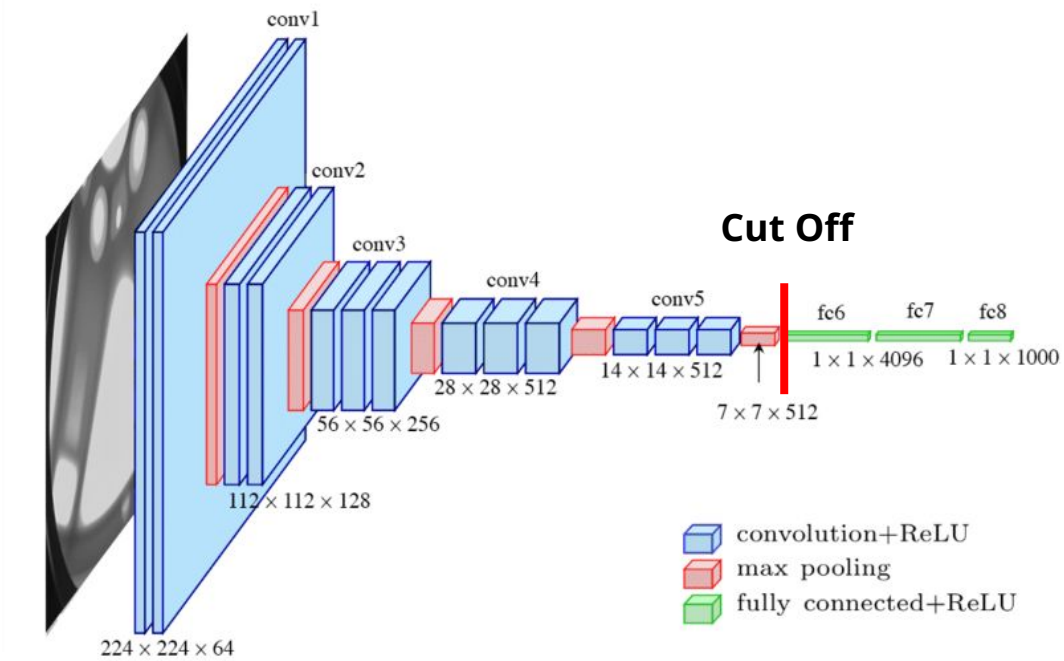
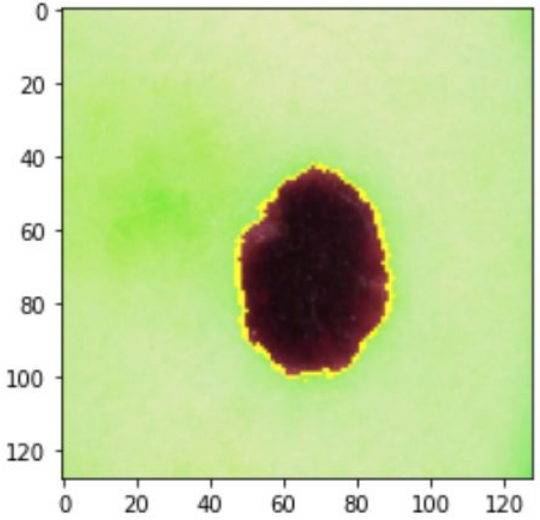
Appendix



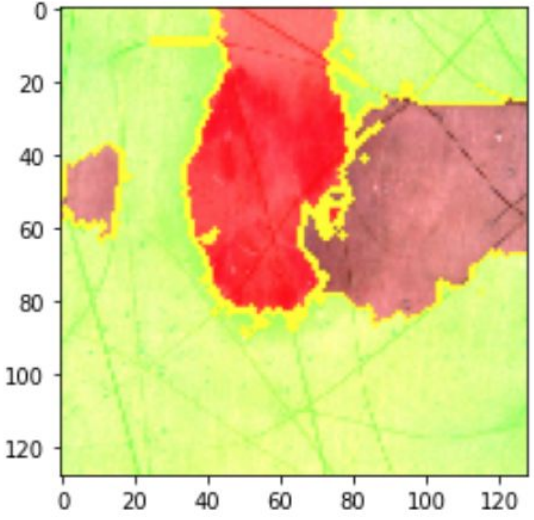
https://www.researchgate.net/figure/Fig-A1-The-standard-VGG-16-network-architecture-as-proposed-in-32-Note-that-only_fig3_322512435

Appendix

Misclassified
Benign Lesion



Misclassified
Malignant Lesion



Misclassified
Unknown Lesion