CAPSTONE

BENIGN V. MALIGNANT MELANOMA CLASSIFICATION

WHY DO WE NEED TO IMPROVE MELANOMA CLASSIFICATIONS?

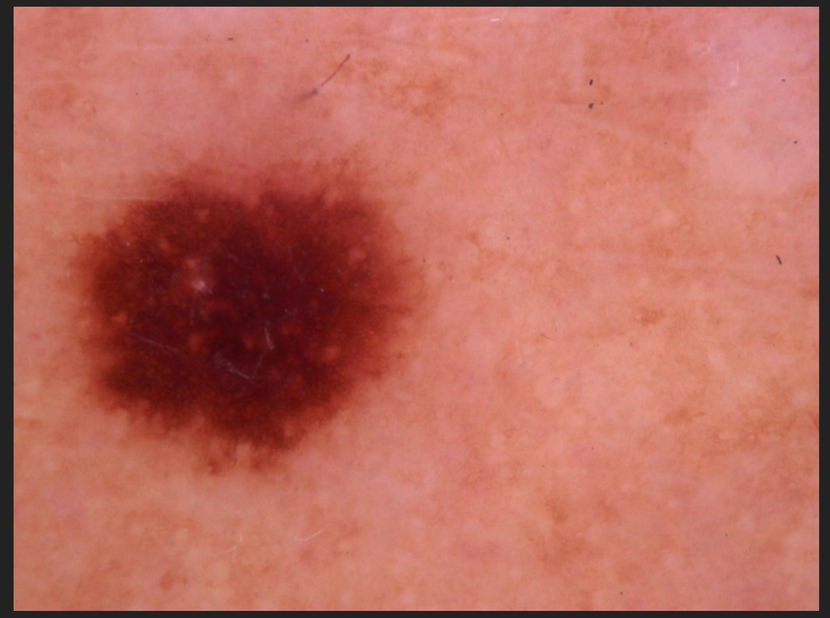
Melanoma is the deadliest form of skin cancer in the world

Despite making up only 20-25% of all skin cancer incidents, melanoma accounts for ~75% of all skin cancer related deaths

High False-Positive rate: 9% of 1000 = 185 Unnecessary Biopsies

MODEL GOALS & PREDICTIONS

- “... the dermatologists accurately detected an average of 86.6% of melanomas, and correctly identified an average of 71.3% of lesions that were not malignant.”
- Diagnosis varies by 10% via Visual Examination
- Goal: > 69%-71.3%



INTERNATIONAL SKIN IMAGING COLLABORATION

Dataset	Total: 15476, Train: 9692, Test: 4135, Val: 1937
Data Demographics	Ages: 15 - 75 years old; Sex: Female: 48%, Male: 52%
Lesion Types:	Basal Cell Carcinoma, Seborrheic Keratosis, etc...

MODELS & METHOD

Keras	Size: 224 x 224; Batch = 32, 128; Epochs = 10, 40
PyTorch	Size: 224 x 224; Batch = 8; Epochs = 20; Scrapped
PyTorch.Resnet34	Size: 256 x 256; Batch = 128; Epochs = 6, 4; Pre-trained

CAN WE ACCURATELY CLASSIFY BENIGN V MALIGNANT LESIONS?

Keras Model: 2

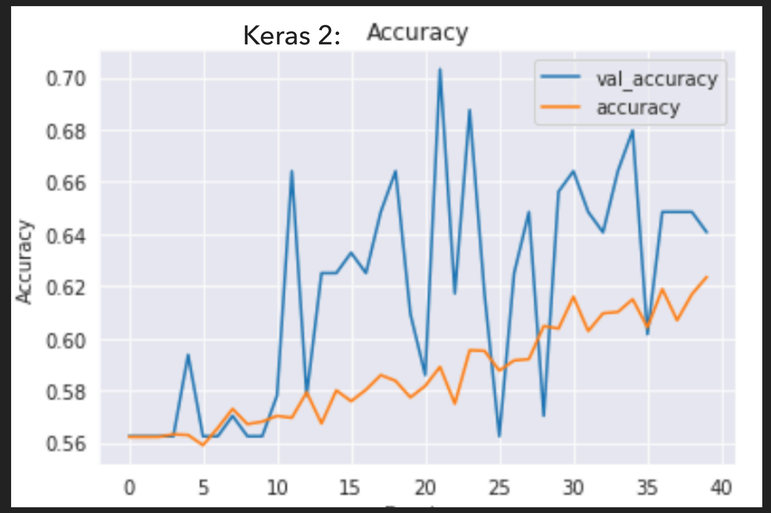
Accuracy: ~76%

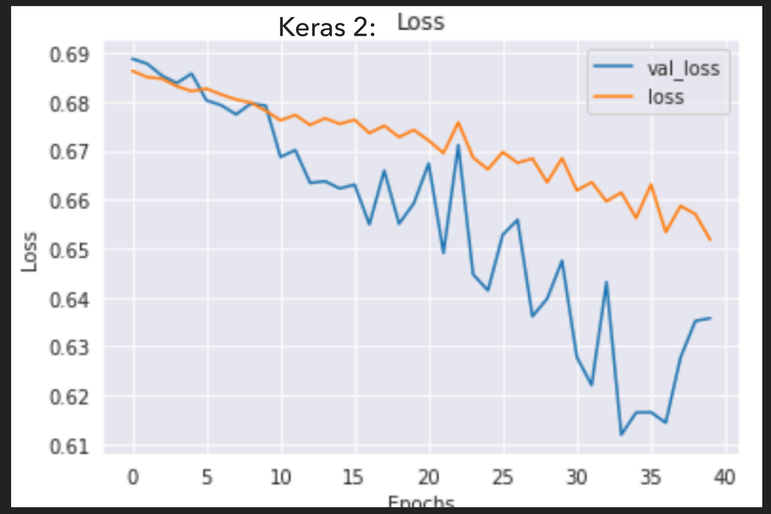
Loss: .599

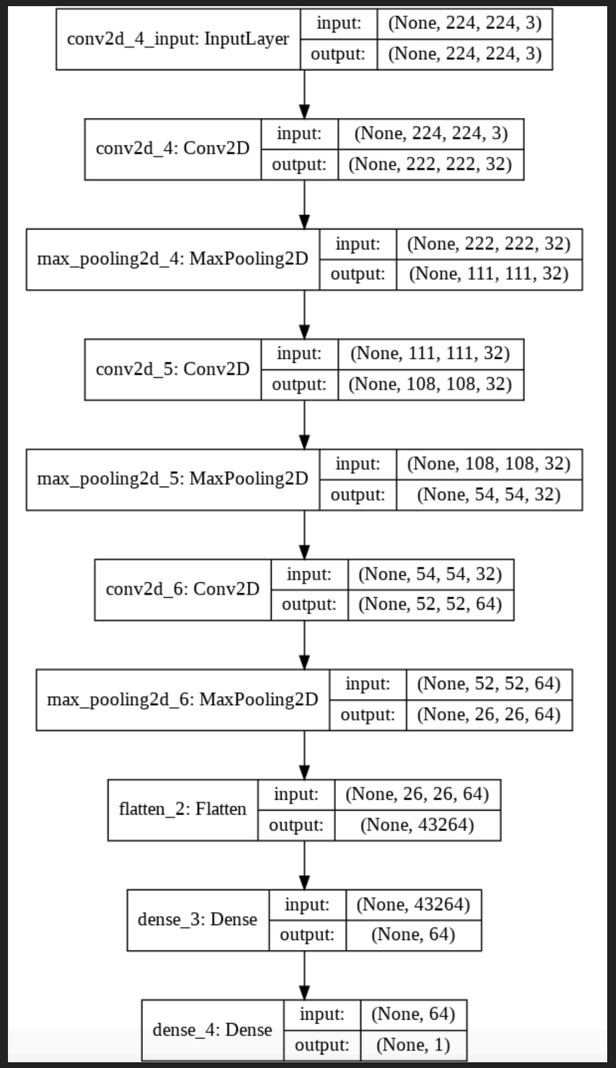
PyTorch.Resnet: FC

Accuracy: ~74%

Loss: .546





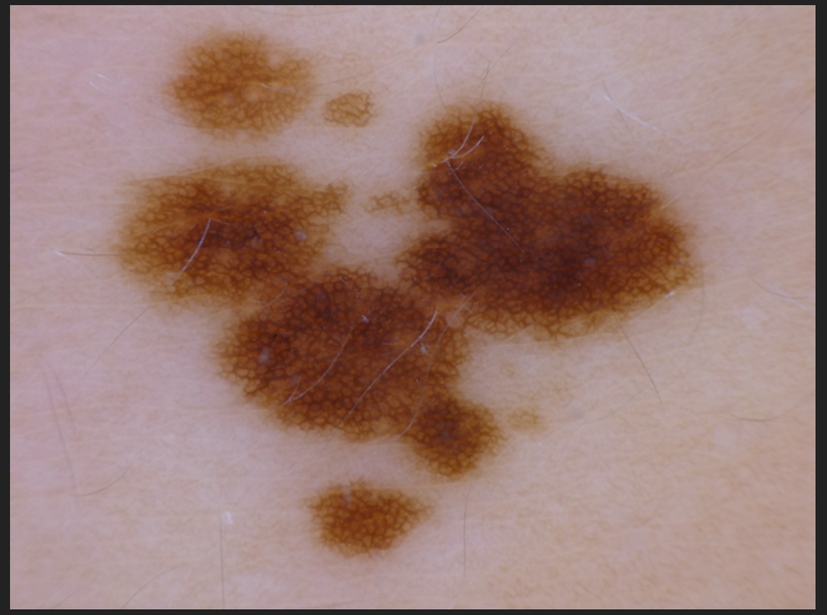


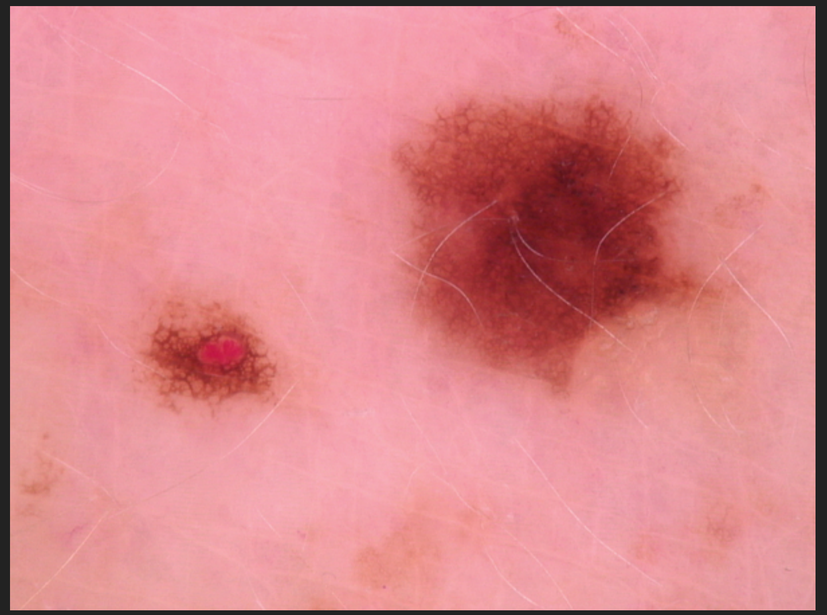
HOW DID WE DO?

- Each of our base models (Keras: 1 & 2; PyTorch: ResNet32 FC)
  - Models: 73% - 76%, Visual Exam: 71.3%, 69% min
- Base PyTorch Model
  - BCE v. CrossEntropy Loss functions failed
- ResNet32, Tuned
  - ResNet performs best tuning the single Fully Connected layer

HOW CAN WE IMPROVE THESE MODELS?

- No Racial Diversity
- Image Uniformity
- Higher Epochs: ResNet
- Multi-Categorical
- Computational Power
- API Datasets





WHAT'S NEXT?

Train the three base models with more diverse, uniform datasets

Implement as a supplementary app or software to aid dermatologists and oncologists

Consumer friendly mobile application

THANK YOU!