Northeastern University

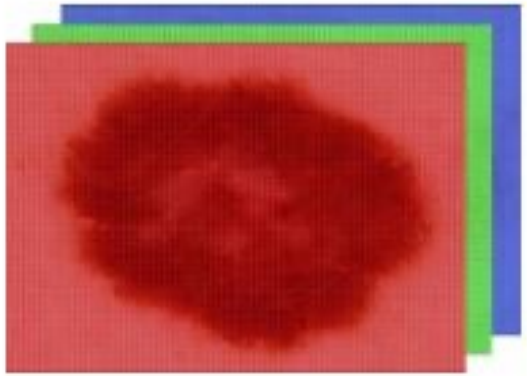
IE 7615: Skin Cancer Detection

Camron Garrett
Karan Paresh Samani
Karan Shah

28th May 2022

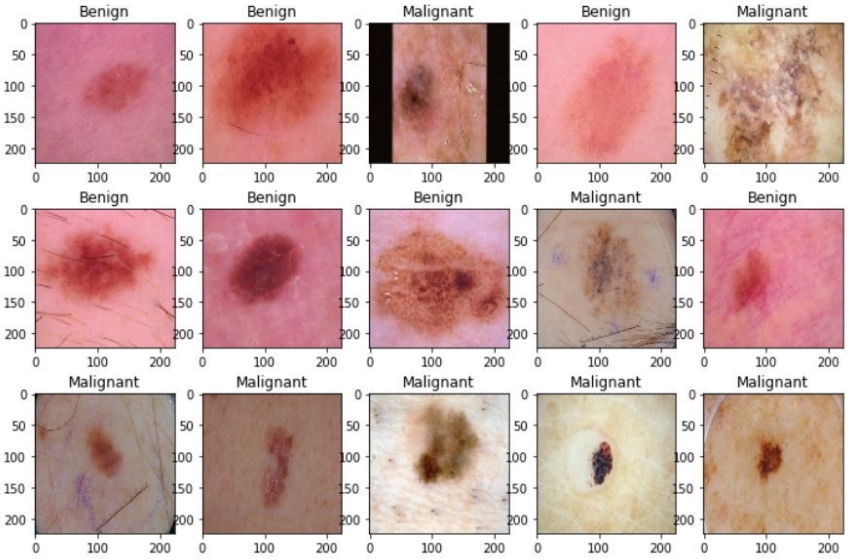
Data Explanation & Motivation

224 x 224 x 3
(RGB Matrix)



- Dataset from the **ISIC (International Skin Image Collaboration)** Archive.

- Consists of 1800 pictures of benign moles and 1497 pictures of malignant moles.



System Design

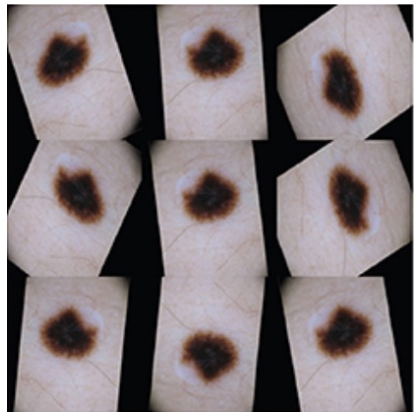
- Proposed System Architecture
- System Performance
  - Confusion matrix parameters

CNN

- Convolution Layer
- Pooling Layer
- Fully connected Layer

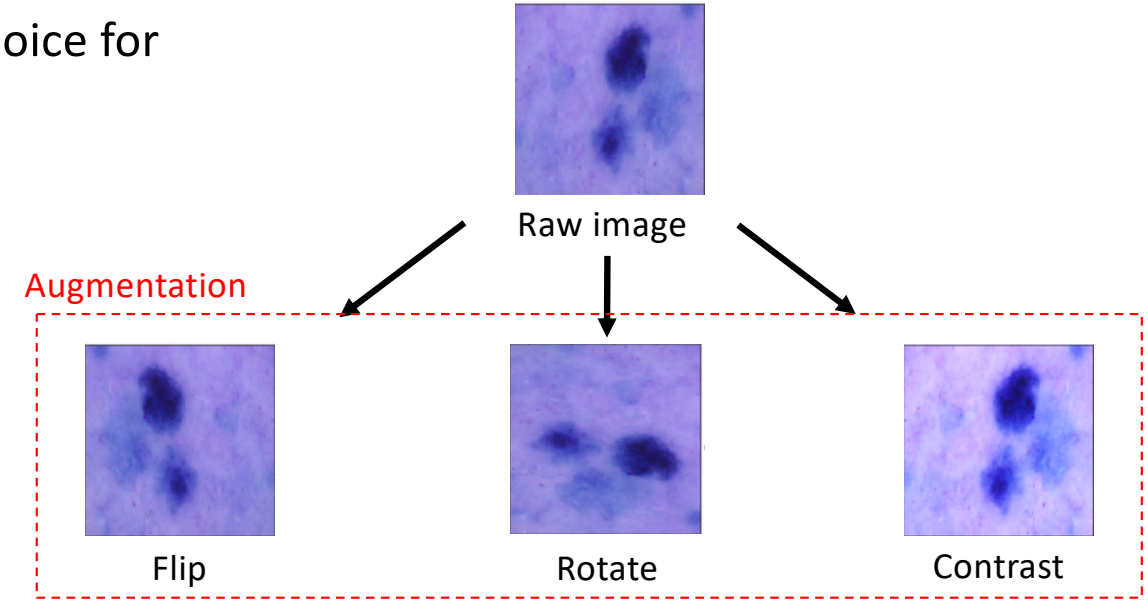
Layers (Type)	Output Shape	Parameters
Input Image	(224, 224, 3)	0
Convolution	(224, 224, 16)	448
ReLU	(224, 224, 16)	0
Max Pooling	(112, 112, 16)	0
Convolution	(112, 112, 32)	4640
ReLU	(112, 112, 32)	0
Max Pooling	(56, 56, 32)	0
Convolution	(56, 56, 64)	18496
ReLU	(56, 56, 64)	0
Max Pooling	(28, 28, 64)	0
Dropout	(28, 28, 64)	0
Flatten	(50176)	0
Dense (ReLU)	(128)	6422656
Dense (Softmax)	(2)	258

Preprocessing (Uniqueness)



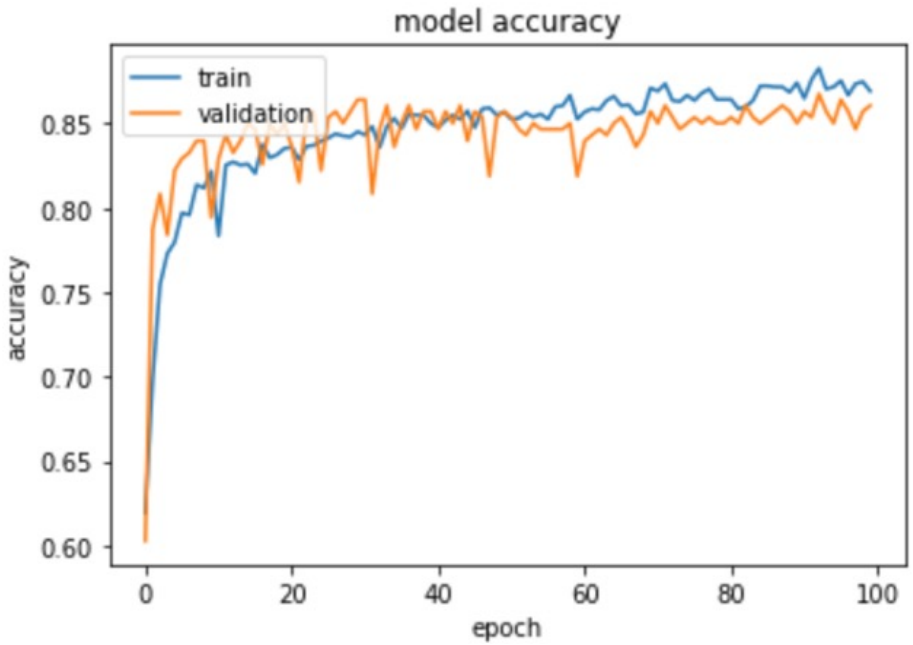
Reshaping for fixed input shape → Necessary before defining number of layers in the CNN architecture

Normalization, Augmentation → Choice for better systems performance

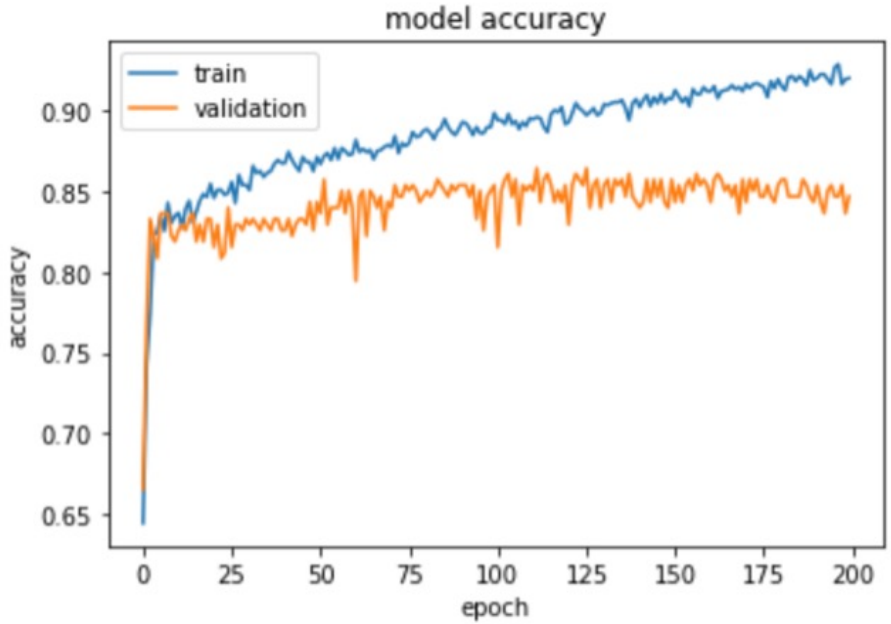


For data Augmentation:
randomized flipping, rotating, contrasting, and adding gaussian noise has been used

Results (1)

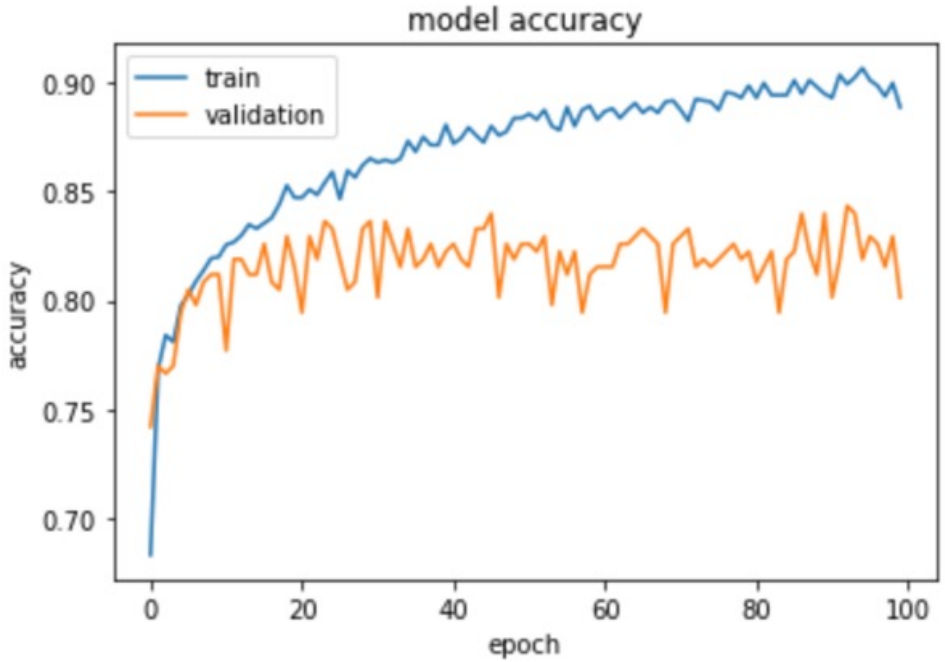


Base Model

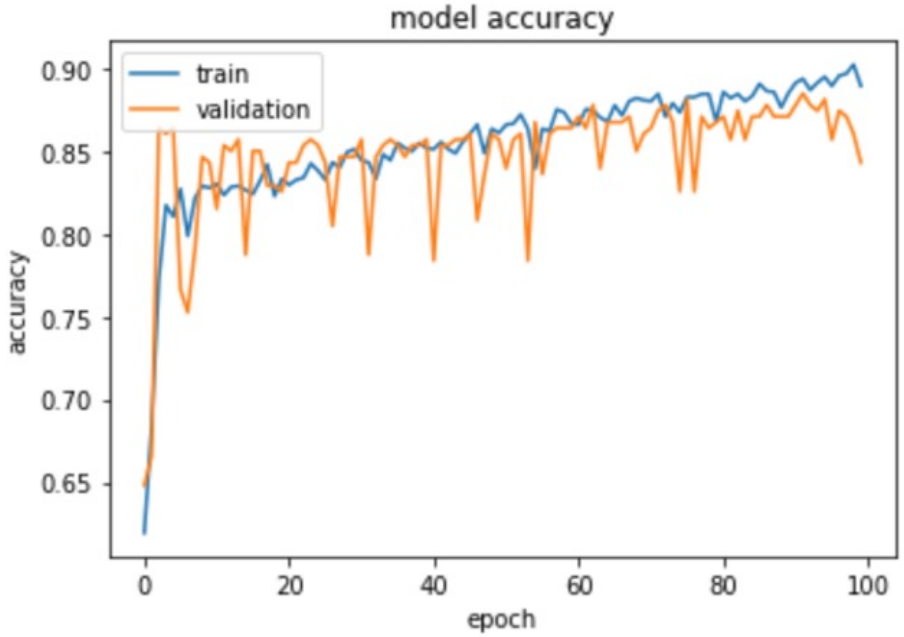


Rotation and Flipping

Results (2)

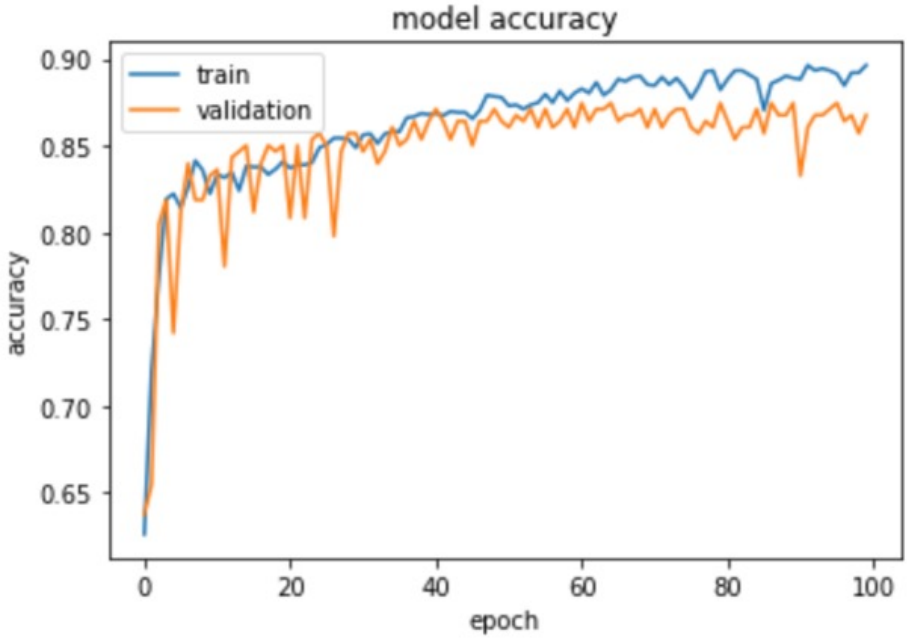


0.5 Contrast Addition

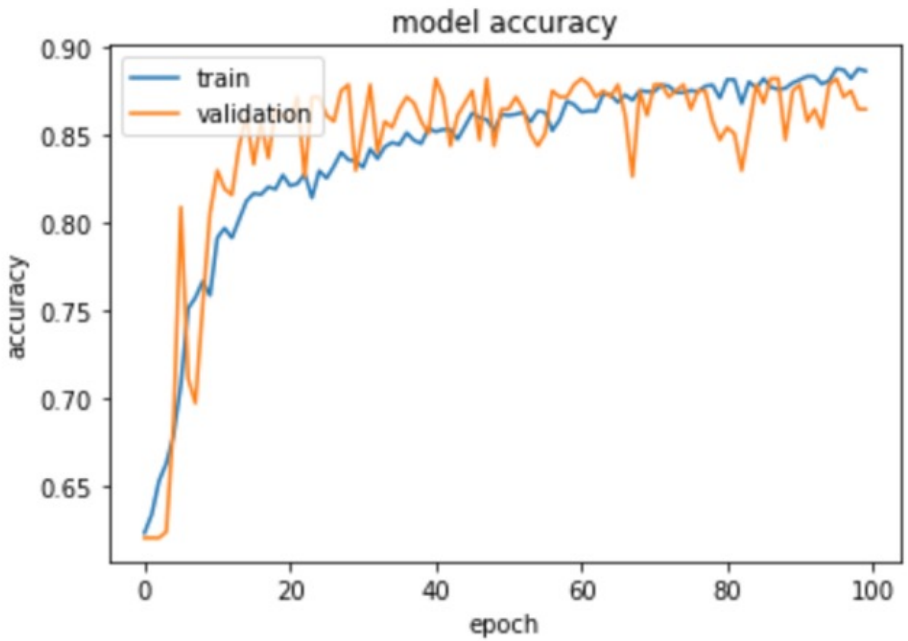


Gaussian Noise Addition

Results (3)



0.9 Contrast Addition



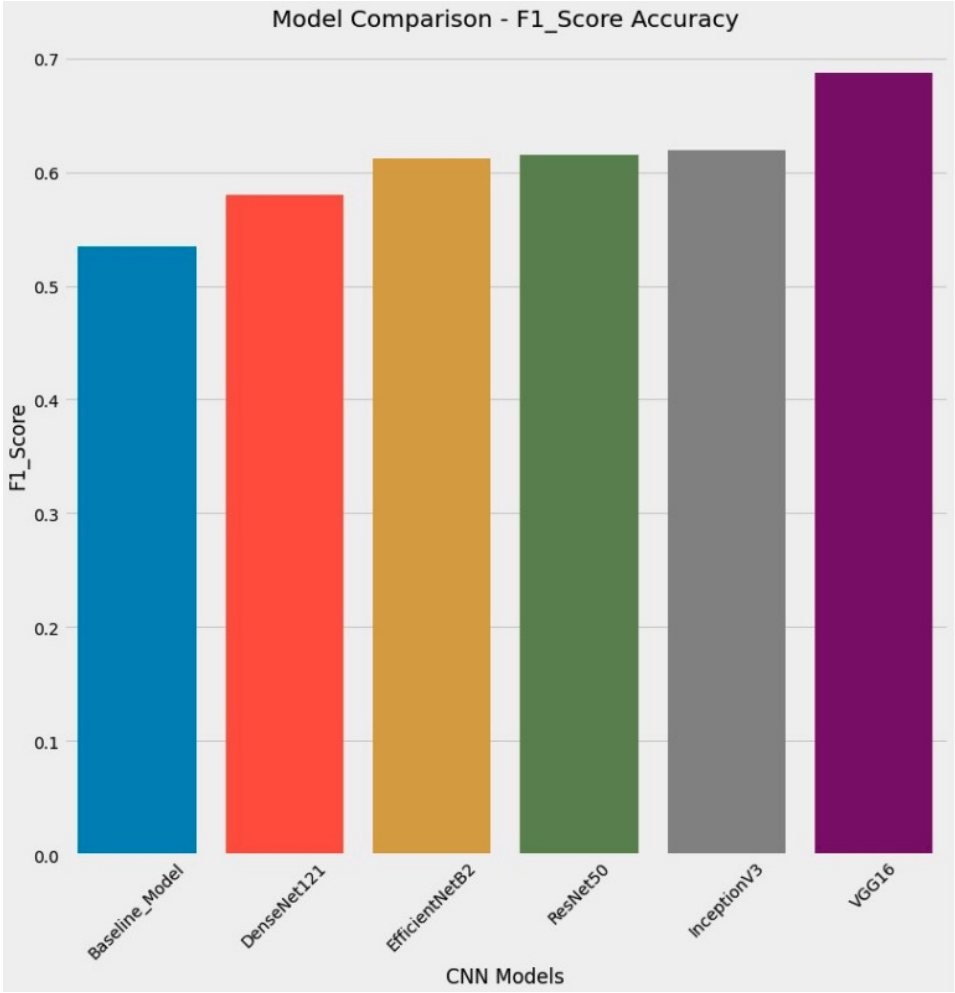
0.9 Contrast Addition

Results (4)

	Training Accuracy (%)	Validation Accuracy (%)
No Preprocessing	86.92	86.06
Flip and Rotate	91.98	84.67
0.2 Contrast	89.64	86.76
0.5 Contrast	88.83	80.14
0.9 Contrast	90.25	83.62
0.01 Gaussian	88.96	84.32

Conclusion and Further Work

- Increased efficiency due to preprocessing of skin cancer lesion images
- Baseline model compared with Transfer Learning Models
- Modified Trainable layers according to the data and problem setup
- Weights assigned to Transfer Learning Models are randomly initialized from the ImageNet Transfer Learning model



Questions??