

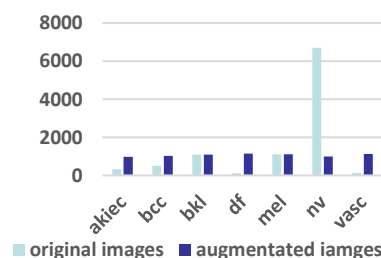
# Skin Doctor: A multi-platform system based on ResNet weighted models for skin lesion classifications

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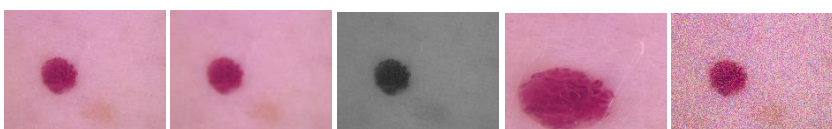
- **Dataset**
- The original dataset has a very serious class imbalance problem, which number of images ranged from 142(vasc, the least) to 6705(nv, the most). Data augmentation is processed to oversample and undersample different classes to ensure the dataset is balance.

Lesion Classes	Original Images	Augmented Images
akiec	327	981
bcc	514	1028
bkl	1099	1099
df	115	1150
mel	1113	1113
nv	6705	1000
vasc	142	1136

### Dataset Classes Distribution



- **Data augmentation**
- **Blurred:** Removing noise and details of the images.
- **Grayed:** Focus the model on variations in intensity.
- **Clipped:** Handle variations in the position of the lesions.
- **Gaussian:** Robust to noise in the input data.
- **Sharpened:** Enhancing the fine details and edges.

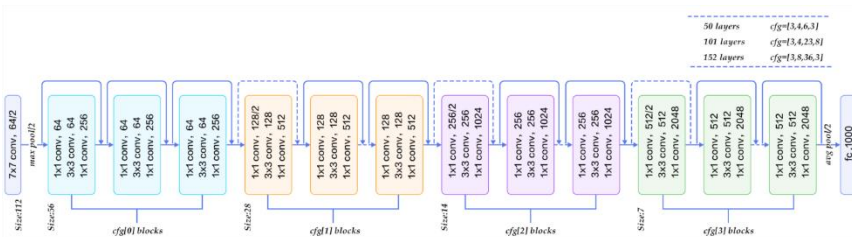


Original	Blurred	Grayed	Clipped	Gaussian
				

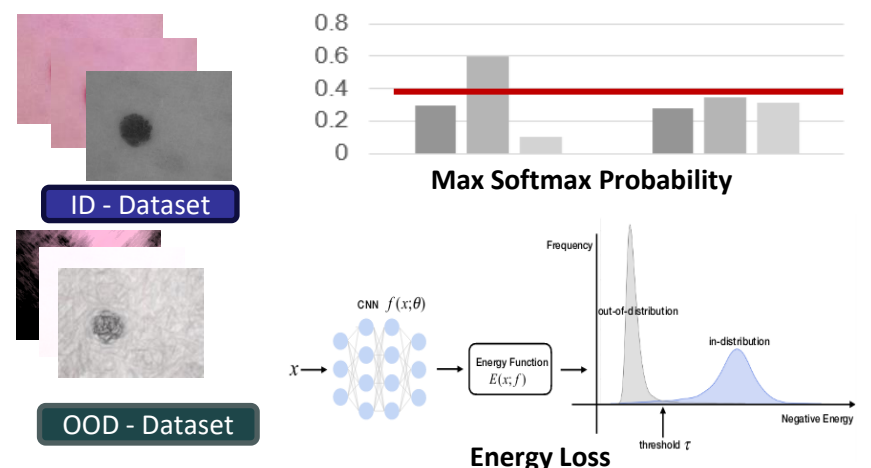
- **Model Training**
- According to the ISIC2018 Task and due to the limit of computing resources, ResNet-50, ResNet-152, ResNet-34 and ResNet-v2 models has been used for model training:

Model Name	Input Size	Loss	Balanced Accuracy
ResNet-50	224 x 224	10.303	0.7352
ResNet-152	224 x 224	6.82	0.7412
ResNet-34	224 x 224	7.03	0.7255
ResNet-50-V2	224 x 224	9.82	0.7381

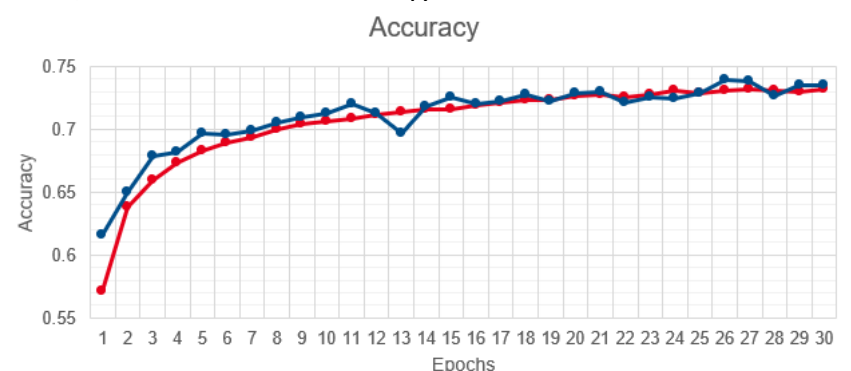
- Here's the model structure of ResNet-50::



- Monte-Carlo Dropout
- Monte-Carlo Dropout with dropout ratio = 0.23 is used in the training process to prevent overfitting and get better performance in the validation dataset.
- OOD Detection
- The project used the maximum softmax function probabilities and the error of the energy function to distinguish the OOD data with ID. An augmented dataset with obvious color distortion and much gaussian white noise are used as OOD dataset to determine the threshold of the two metrics mentioned.



- **Evaluation**
- After 30 epochs the multi-class balanced weighted accuracy for different models reached 0.736/1 and the loss function of cross entropy reached 7.032.



- **Project Structure**

