Medical Image Analysis

Final Review Questions

- Daksh Bagga
- 20BAI1157

Q1) What is the resized image and original image size?

Ans) The original image dimensions vary, listed below:

```
(1024, 1024, 3)    86
(450, 600, 3)      57
(472, 720, 3)       6
(480, 720, 3)       5
(464, 720, 3)       3
(680, 1024, 3)      2
(768, 1024, 3)      1
(685, 1024, 3)      1
(474, 720, 3)       1
(589, 720, 3)       1
(720, 479, 3)       1
(720, 477, 3)       1
(720, 472, 3)       1
(595, 720, 3)       1
(720, 493, 3)       1
dtype: int64
```

'(x,y,z)' represents the image dimensions and the number 'k' next to it represents the number of images with that particular dimension

The resized image size is 200x200 pixels

```
s = 200
image_array = cv2.resize(image , (s,s))
        X_train.append(list(image_array))
        y_train.append(code[folder])
```

Q2) Relate your skin image with Resnet and VGG.

Ans) When dealing with medical images, both VGG and ResNet, as pre-trained models, can be used for transfer learning to leverage the features learned from a large dataset (like ImageNet) and adapt them to the specific characteristics of skin lesion images. This can significantly enhance the performance of a model trained on a relatively small medical dataset by leveraging the knowledge acquired from a broader dataset during pre-training.

The deeper layers of these networks tend to learn complex and high-level features that can be valuable for distinguishing between different classes of skin lesions.

VGG: VGG architectures may be simpler to implement and experiment with, making them suitable for smaller medical datasets or when computational resources are limited.

ResNet: ResNet, with its residual connections, is often preferred for more complex tasks or when dealing with larger medical datasets, as it can effectively capture hierarchical features which greatly helps in classification. I listed ResNet 152 to be more accurate than others in the paper.

Q3) What is a tensor?

In the context of my project on skin lesion classification using CNNs, a tensor is a fundamental data structure representing multi-dimensional arrays, where each dimension corresponds to a different feature. In the case of medical images, tensors are used to represent pixel values and color channels. CNNs (Convolutional Neural Networks) leverage tensors as input data, applying convolutional operations to capture spatial hierarchies of features in the images. Tensors, with their multi-dimensional nature, are essential for efficiently processing and manipulating image data within CNNs, allowing the model to learn hierarchical patterns and features relevant to skin lesion classification tasks.