REPORT - GROUP 31

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Topic:
Chest cancer detection using machine learning and deep leaning (CNN)

Synopsis:

The CNN Model we have used here is VGG-16. It stands for visual geometry group with a 16 layer depth. It is an object detection and classification algorithm which is able to classify 1000 images of 1000 different categories with 92.7% accuracy. It also won the ImageNet Large Scale Visual Recognition Challenge (ILSVRC) of 2014.

Given data contains 3 chest cancer types which are
- adenocarcinoma
- large cell carcinoma
- squamous cell carcinoma

and 1 folder for the normal cell.

The given dataset is divided as follows:
training set - 70%, testing set - 20%, validation set - 10%

The dataset was first imported from Kaggle and unzipped in the source directory of Google Colab.

Model:

Base model used was VGG-16. A series of flatten, batch normalization, dense and relu activation layers were added to it. Dropouts of 0.5 were added in between the sequence. The dropout layer randomly sets input units to 0 with a frequency of rate at each step during training time, which helps prevent overfitting of data.

VGG (architecture):

VGG16 is a pretrained network with only convolutional and pooling layers. The convolutions have a fixed kernel size of 3x3 with strides of 1 px and padding of 1px. The 5 max-pool layers have a 2x2 window with stride of 2px.

It has 3 fully-connected layers for activation - 2 ReLu and 1 softmax. The softmax is final layer. The input size of VGG is 224x224.

Learning algorithm of VGG:

- Stochastic gradient descent based on backpropagation
- Initial learning rate = 0.001
- The rate is reduced by a factor of 10 once the validation set accuracy stops improving

Accuracy: An accuracy of upto 80% was achieved on training the compiled model over 20 epochs.

Results:
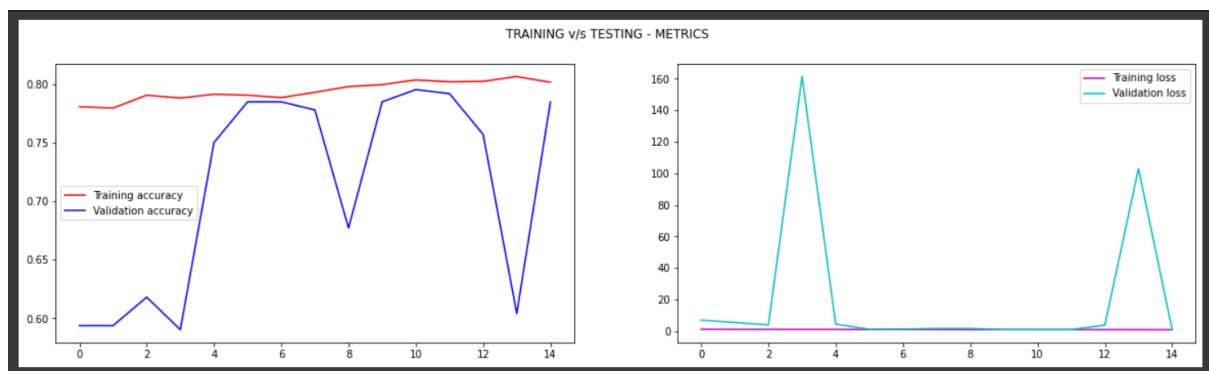
A plot of accuracy and loss values for training and testing over the dataset (x-axis) w.r.t. number of epochs completed (y-axis).