Image Classification: Detection of covid19, normal and pneumonia from chest x-ray image dataset using ensemble methods.

Akshen Doke, x18191592
MSc in Data Analytics
National College of Ireland

Viva Questions Response.

1. What was the number of images in the datasets?

    - **The number of images used in the project was for covid: 163, for normal: 937 and for pneumonia: 2540 in total 3640 images.**

2. What is the justification to choose the 7 models selected for ensemble model?

    - **As stated in** (Mohammad Tariqul Islam, 2017)**, they trained different variants of AlexNet, ResNet and VGG based models and formed an ensemble using the same.**
    - **They observed that after 9 models the performance remained consistent.**
    - **Also the number of datapoints we had were low compare to the general norms of an image classification model to be trained on a million images.**
    - **Hence learning from the observations stated above and to avoid the chances of overfitting the number of models chosen were 7 which consisted 5 transfer learning based models based on different architecture and input image size, 1 model coded from scratch based on** (Krizhevsky, et al., 2012) **and 1 experimental model.**

3. Why are the input image size for the models different?

    - **Since all the models used had different architecture and different input image layer hence the images were resized and feed to each model according to the first layer i.e. input layer for that particular model.**

4. Since the author proposed the MyModel, more details and justification should have been provided.

    - **This model is an experimental model which was built under motivation to see performance on our dataset in comparison to the transfer learning models which were trained on huge datasets ranging from different classes and optimized on superior hardware.**
    - **As far as the architecture is concerned, it was inspired by AlexNet and DenseNet.**
    - **Initial layers which were based on Retified Linear Units (ReLUs) activation function are proven to train several times faster then their equivalents i.e.**

tanh. In the referred paper (Krizhevsky, et al., 2012) this was demonstrated using the CIFAR-10 dataset.
- **Input image size was chosen to be the most standard which is 224*224 and occasionally pooling layers** (Pokharna, 2016) **were added to reduce the spatial dimensionality in order to bring down the parameters for computation in the network. To bring stability and make it faster, batch normalizing (Multiple, 2021) was done and further the image was flatten and passed on.**
- **Dropouts at the end ensured the model is not overfitted on the given dataset.**
- **The model did give a reliable accuracy which was as good as a pre-trained model based on the current experimental evidence yet in future more optimization and modification can be done if data from different classes is considered.**

5. Why was the DenseNet selected to be counted twice since it shows almost the worst result?

   - **Three models i.e. VGG16, NasNet and Xception achieved an accuracy above 97% and DenseNet got 96.77 % yet it was chosen against VGG16 to balance out on the image input size as it had 224*224.**
   - **While VGG16 and Xception both had 299*299 input image size but the later in this case had more accuracy then the former.**

Works Cited

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