**PROJECT REPORT**

APPLYING CONVOLUTION NETWORKS (CONVNETS )

TO IMAGE DATA

**INTRODUCTION**

In this assignment, we have examined the connection between training samples and found out whether it is better to train your model from scratch or use a pre-trained convnet.

Training and validation accuracy:

Chart

Description automatically generated

Chart

Description automatically generated

Chart

Description automatically generated with medium confidence

The above outputs of three models built from scratch show that increasing the training sample size increases model accuracy.

* By changing the training sample and utilizing optimization techniques, the optimum method to prevent overfitting has been determined. Expanding the training sample isn't always practical therefore Data augmentation is one method for maximizing the limited training data.
* When the model's size, or the number of learnable parameters in the model, which is essentially the number of layers and the number of units in layers, is reduced, overfitting is considerably reduced.
* By restricting the weights to allow only extremely small values, one can reduce or avoid overfitting by regularizing the distribution of the weight values. This reduces the complexity of the network.
* I have incorporated learning rate and dropout techniques for optimization purposes. In comparison to the previous model, the new model with a larger sample size and optimizers used provided greater accuracy.
* VGG16 Pretrained Convnet was used for this model.
* A fine-tuned, pre-trained VGG16 model - Optimizing the model In order to fine-tune a model, some of the top layers of a frozen model base utilized for feature extraction must be unfrozen and trained simultaneously with the newly added model component (in this case, the fully connected classifier). The process of fine-tuning involves making little changes to the more abstract model representations that are being reused in order to make them more applicable to the job at hand.
* The use of a pre-trained network further increased the accuracy of the model with the same sample sizes as the previous model, though the number of epochs selected was only 20.

**CONCLUSION**

It can be concluded that more data is always beneficial for increasing data training and thus improving accuracy. As a result, we can see that a pre-trained network can be useful in building a better model with less input and increased accuracy due to extensive training given to the pre-trained network previously.