Deep Learning

Assignment 1

# Assignment Gdrive Link:

<https://drive.google.com/drive/folders/1tSd8r_u-5REvWu5RZuIBhbY593px6zlV?usp=sharing>

# Assignment Description:

**Transfer Learning - Accuracy comparison of various pre-trained CNN Model for Chest CT Scan Image classification**

1. The assignment is to train, predict diseases based on Chest CT Scan images with various pre-trained transfer learning models like InceptionV3.
2. The assignment is to try with different hyper parameters and fine tuning for each such models such that the accuracy of prediction increases.
3. The assignment is to compare each such model for accuracy and other evaluation metrics to find the best model that suits the problem.

# Dataset and Base python file:

1. Dataset has different Chest CT Scan images that is put into different folders such as valid, test, train.
2. Dataset has images in different folders that specify what type of disease the image denotes such as adenocarcinoma, large.cell.carcinoma, normal, squamous.cell.carcinoma
3. Base Jupyter Python Notebook is shared which is using InceptionV3 model to train, test and evaluate the model.

# Hyperparameters used:

By manually trying with different parameters, I found that **below parameters best suit this problem:**

1. Use imagenet pretrained weights
2. Fine-tuning only last 10 layers
3. Iterate the dataset for 15 Epoch
4. Use Batch size as 22 which is half the size of full dataset.
5. Use accuracy function for evaluation along with loss function in model compile.
6. Add 3 extra dense layer for classification of new data.

# Model Evaluation:

A screenshot of a computer

Description automatically generated

# Evaluation Metrics Plot:

A graph with blue and orange lines

Description automatically generated

# F1-Score for each class for each model:

A graph of lines and lines

Description automatically generated with medium confidence

# Epoch - Loss History for each model:

A group of graphs showing different types of data

Description automatically generated

# Epoch - Accuracy History for each Model:

A group of graphs showing different types of data

Description automatically generated

# Conclusion:

densenet201and inception\_v3 model performs better than other models as their accuracy, f1-score and recall is high.

# References:

* Dataset and Base ipynb file <https://wilpbitspilaniacin0.sharepoint.com/:u:/r/sites/DeepLearningS2-23_SSZG529Regular/Shared%20Documents/General/TL_Full_Docs.zip?csf=1&web=1&e=iq7uXq>
* Assignment Description 1 from Lecture Recording at 44:59 <https://wilpbitspilaniacin0.sharepoint.com/:v:/r/sites/DeepLearningS2-23_SSZG529Regular/Shared%20Documents/General/Recordings/Deep%20Learning%20(S2-23_SSZG529)(Regular)-20240307_191148-Meeting%20Recording.mp4?csf=1&web=1&e=e2Cvx6&nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJTdHJlYW1XZWJBcHAiLCJyZWZlcnJhbFZpZXciOiJTaGFyZURpYWxvZy1MaW5rIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXcifSwicGxheWJhY2tPcHRpb25zIjp7InN0YXJ0VGltZUluU2Vjb25kcyI6MjcyOX19>
* Assignment Description 2 from Lecture Recording at 42:20 <https://wilpbitspilaniacin0.sharepoint.com/:v:/r/sites/DeepLearningS2-23_SSZG529Regular/Shared%20Documents/General/Recordings/Deep%20Learning%20(S2-23_SSZG529)(Regular)-20240324_180801-Meeting%20Recording.mp4?csf=1&web=1&e=wYVGSX&nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJTdHJlYW1XZWJBcHAiLCJyZWZlcnJhbFZpZXciOiJTaGFyZURpYWxvZy1MaW5rIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXcifSwicGxheWJhY2tPcHRpb25zIjp7InN0YXJ0VGltZUluU2Vjb25kcyI6MjU0MH19>
* Reference Research Paper <https://www.researchgate.net/figure/The-accuracy-comparison-of-pre-trained-CNN-models_tbl2_335717881>
* Keras Applications <https://keras.io/api/applications/>
* Python Pandas Docs <https://pandas.pydata.org/docs/reference/index.html#api>
* Matplotlib Docs <https://matplotlib.org/stable/api/index.html>
* Tensorflow Keras Docs <https://www.tensorflow.org/api_docs/python/tf/keras>