Model Development Phase

Date	17th June 2025
Team ID	SWTID1749820017
Project Name	Dog Breed Identification using Transfer Learning
Maximum Marks	5 Marks

Model selection report

Now comparing the two models we can clearly see that model 2 is half the size of model 1. Now on training both these models we found out that model 2 (the smaller model – NASNetLarge with Flatten() layer) gave a higher validation accuracy than model 1 (the larger model – NASNetLarge with GlobalAveragePooling2D() layer).

```
val_loss_1, val_acc_1 = model1.evaluate(val_generator)
print(f"Model 1 (NASNet + Flatten) - Val Loss: {val_loss_1:.4f}, Val Accuracy: {val_acc_1:.4f}")

val_loss_2, val_acc_2 = model2.evaluate(val_generator)
print(f"Model 2 (NASNet + GlobalAvgPool) - Val Loss: {val_loss_2:.4f}, Val Accuracy: {val_acc_2:.4f}")
```

```
32/32 ━━━━━━━━━━━━━━━━━━━━ 101s 3s/step - accuracy: 0.9245 - loss: 0.3932
Model 1 (NASNet + Flatten) - Val Loss: 0.4252, Val Accuracy: 0.9182
32/32 ━━━━━━━━━━━━━━━━━━━━ 101s 3s/step - accuracy: 0.9313 - loss: 0.2507
Model 2 (NASNet + GlobalAvgPool) - Val Loss: 0.2692, Val Accuracy: 0.9258
```

Model	Description	Hyperparameters used	Performance Metric
NASNetLarge with the Flatten() Layer	NASNetLarge base model with a Flatten layer followed by a Dense classification head. High-capacity architecture, effective for deep feature extraction.	Learning rate = 10^{-4} Batch size=128 Epochs=40 Early stopping was used with a patience of 7. Reduce Learning rate on plateau was also used with a factor of 0.1, patience of 3 and a minimum learning rate of 10^{-6}	Validation accuracy of 91.82% Weighted F1 Score: 0.9182 Weighted Precision: 0.9206 Weighted Recall: 0.9182

NASNetLarge with GlobalAveragePooling 2D() layer	NASNetLarge base with GlobalAveragePooling2D layer, providing a more compact and efficient feature summarization. Helps reduce overfitting and model size.	Learning rate = 10^{-4} Batch size=128 Epochs=40 Early stopping was used with a patience of 7. Reduce Learning rate on plateau was also used with a factor of 0.1, patience of 3 and a minimum learning rate of 10^{-6}	Validation accuracy of 92.58% Weighted F1 Score: 0.9297 Weighted Precision: 0.9324 Weighted Recall: 0.9295