

## Model Development Phase

Date	17 <sup>th</sup> 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

<u>Model</u>	<u>Description</u>	<u>Hyperparameters used</u>	<u>Performance Metric</u>
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% <div>Weighted F1 Score: 0.9182 Weighted Precision: 0.9206 Weighted Recall: 0.9182</div>

NASNetLarge with GlobalAveragePooling 2D() layer	NASNetLarge base with GlobalAveragePooling2D layer, providing a more compact and efficient feature summarization. Helps reduce overfitting and model size.	<p>Learning rate = <math>10^{-4}</math>  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 <math>10^{-6}</math></p>	<p>Validation accuracy of 92.58%</p> <div> <p>Weighted F1 Score: 0.9297  Weighted Precision: 0.9324  Weighted Recall: 0.9295</p> </div>
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