CAT CLASSIFICATION

mini project AI

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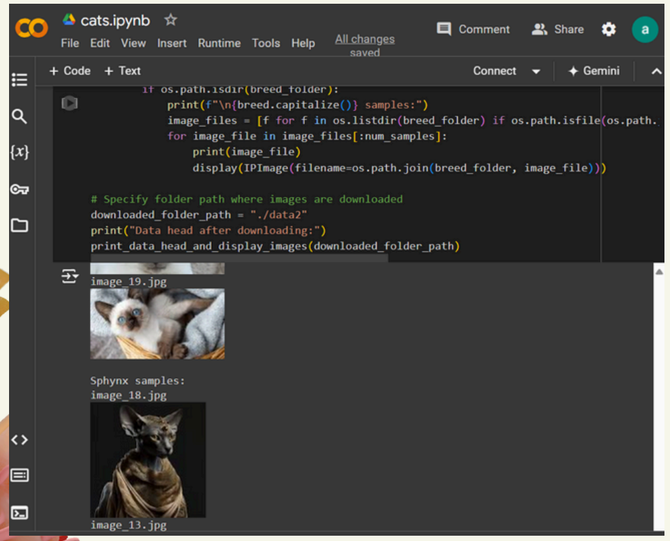
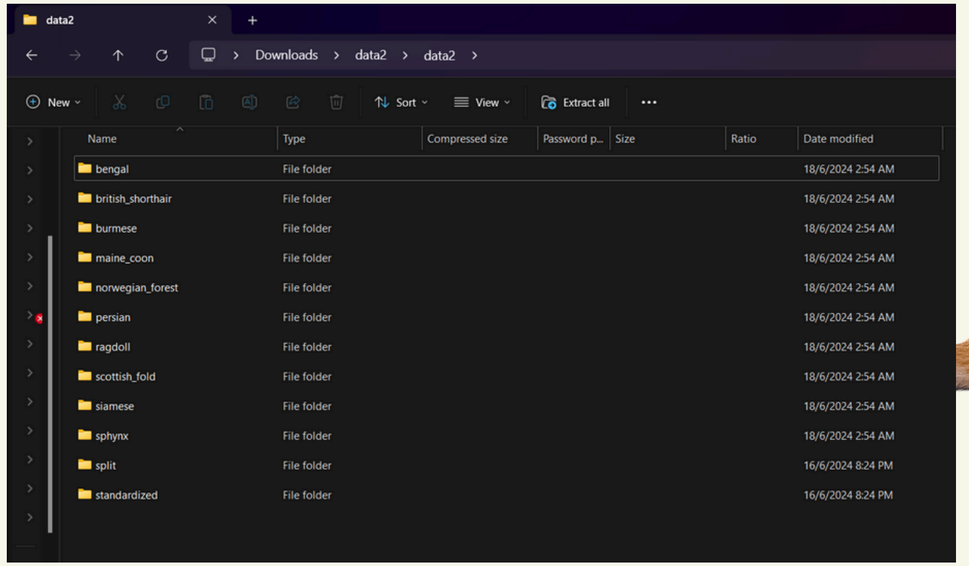
DATA PREPARATION

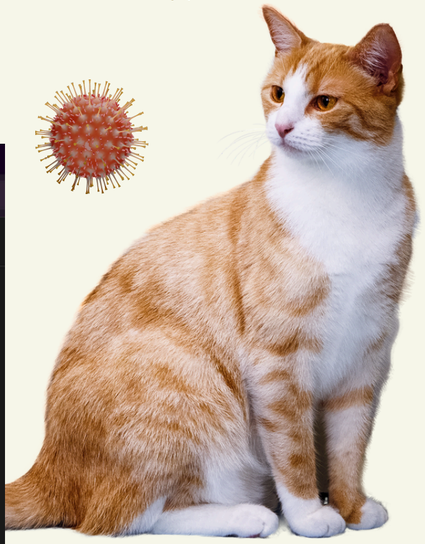
1. we are using Kaggle to collect our data

kaggle™

2. standardizing and creating dataset







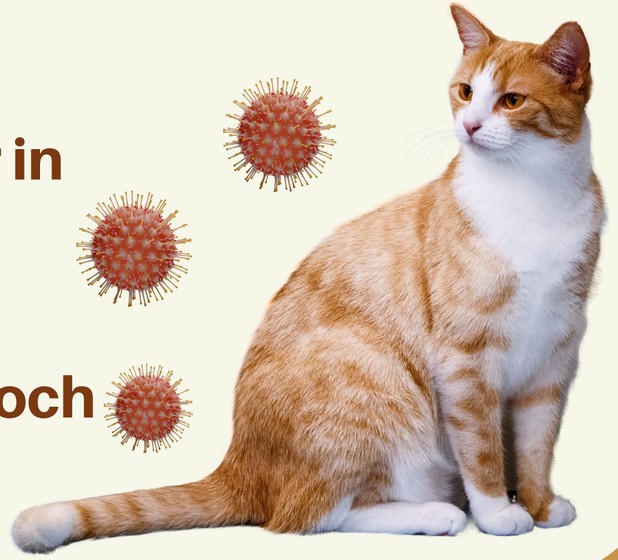
DATA MODELLING

import 3 CNN models used in this mini project:

1. **ResNet50**
2. **DenseNet121**
3. **MobileNetV3Small**

Model training:

1. **We train 50 epochs for 3 models together in one cell**
2. **We show the graph of training loss / loss function to show how loss evolve over epoch**



cats.ipynb

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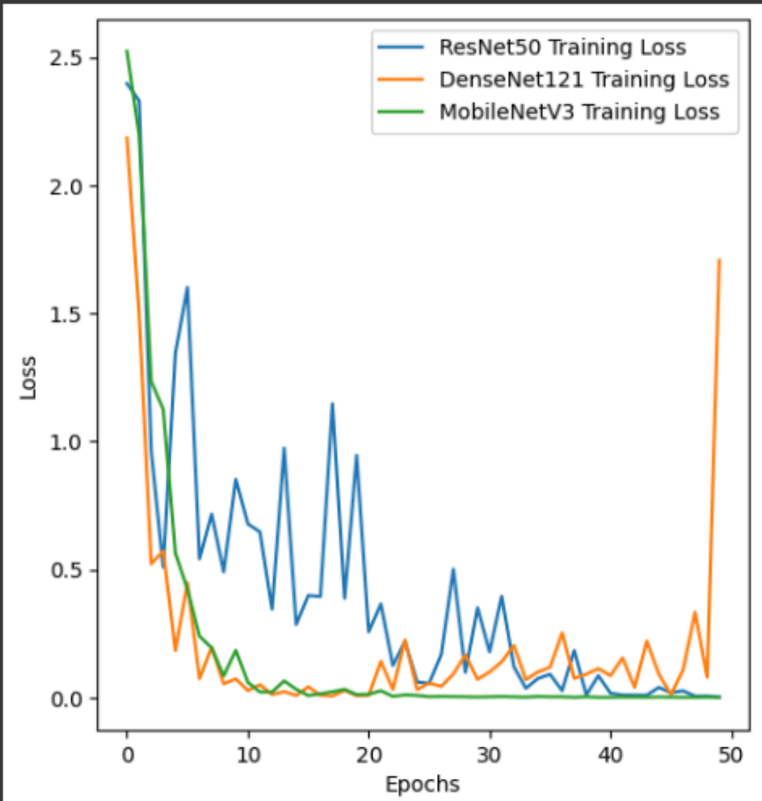
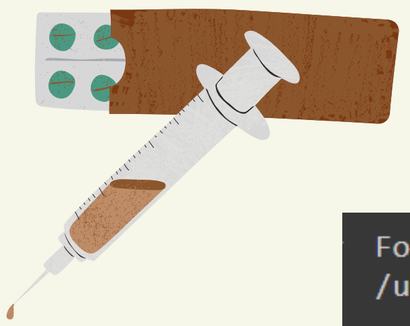
```
MobileNetV3 Test Accuracy: 10.00%
5/5 ━━━━━━━━━━━━━━━━━━━━ 3s 588ms/step
MobileNetV3 mAP: 0.1270
```



this is the training loss graph



3. Model Evaluation Metrices

we record the Accuracy, mAP and training time for each models

```
Found 140 images belonging to 10 classes.
/usr/local/lib/python3.10/dist-packages/keras/src/trainers/data_adapters/py_dataset_adapte
  self._warn_if_super_not_called()
5/5 ━━━━━━━━━━━━━━━━━━━━ 31s 5s/step - accuracy: 0.0516 - loss: 3.5399
ResNet50 Test Accuracy: 10.00%
5/5 ━━━━━━━━━━━━━━━━━━━━ 31s 6s/step
ResNet50 mAP: 0.1586
5/5 ━━━━━━━━━━━━━━━━━━━━ 33s 7s/step - accuracy: 0.1420 - loss: 8.5349
DenseNet121 Test Accuracy: 22.14%
5/5 ━━━━━━━━━━━━━━━━━━━━ 27s 5s/step
DenseNet121 mAP: 0.4218
5/5 ━━━━━━━━━━━━━━━━━━━━ 2s 379ms/step - accuracy: 0.1852 - loss: 2.7268
MobileNetV3 Test Accuracy: 10.00%
5/5 ━━━━━━━━━━━━━━━━━━━━ 3s 588ms/step
MobileNetV3 mAP: 0.1270
```

DenseNet121:

- Test Accuracy: 22.14%
- Loss: 8.5349
- mAP: 0.4218
- Training Time: 33 seconds per epoch

ResNet50:

- Test Accuracy: 10.00%
- Loss: 3.5399
- mAP: 0.1586
- Training Time: 31 seconds per epoch

MobileNetV3:

- Test Accuracy: 10.00%
- Loss: 2.7268
- mAP: 0.1270
- Training Time: 2 seconds per epoch

DenseNet121:

- Test Accuracy: 22.14%
- Loss: 8.5349
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- Training Time: 33 seconds per epoch

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- Test Accuracy: 10.00%
- Loss: 3.5399
- mAP: 0.1586
- Training Time: 31 seconds per epoch

MobileNetV3:

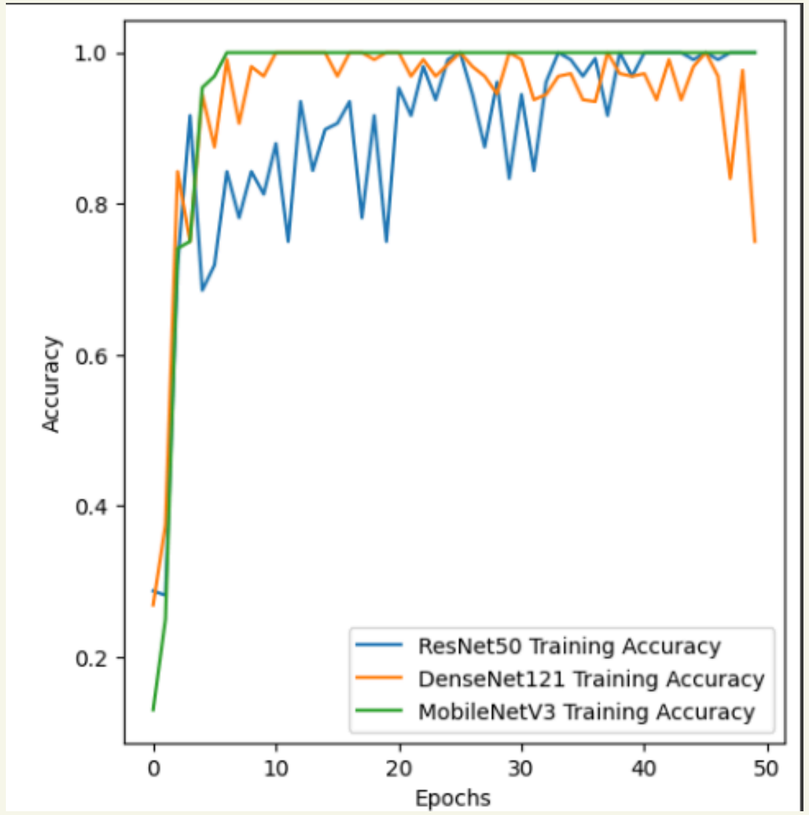
- Test Accuracy: 10.00%
- Loss: 2.7268
- mAP: 0.1270
- Training Time: 2 seconds per epoch

- DenseNet121 outperformed the other models in terms of accuracy, achieving 22.14%.
- It also had the highest mAP, indicating better precision and recall compared to the other models.
- Despite the high loss value, its higher accuracy and mAP suggest it is better at recognizing patterns in the dataset.

- The ResNet50 model showed low accuracy, suggesting it struggled to correctly classify the images.
- The mAP value indicates poor precision in its predictions.
- The high loss value reflects significant errors during predictions.

- MobileNetV3, like ResNet50, achieved low accuracy.
- Its mAP was also the lowest, indicating it had difficulty making precise predictions.
- However, it was the fastest to train, with significantly lower training time per epoch.

- this is accuracy graph and a comparison for each models.



- for validation, we did not have our graph, but

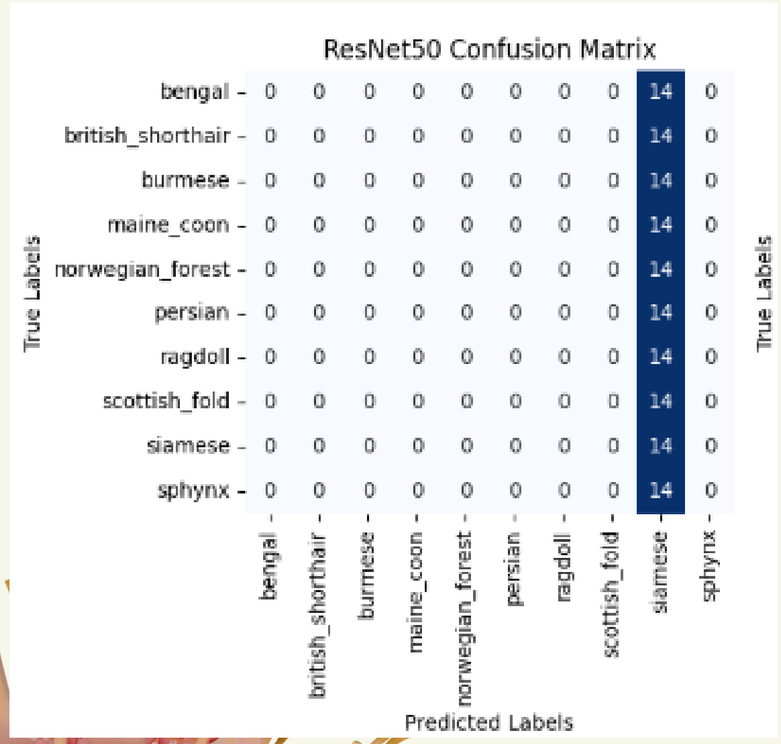
for DenseNet121 performs the best with relatively higher and more stable validation accuracy and a decreasing trend in validation loss.

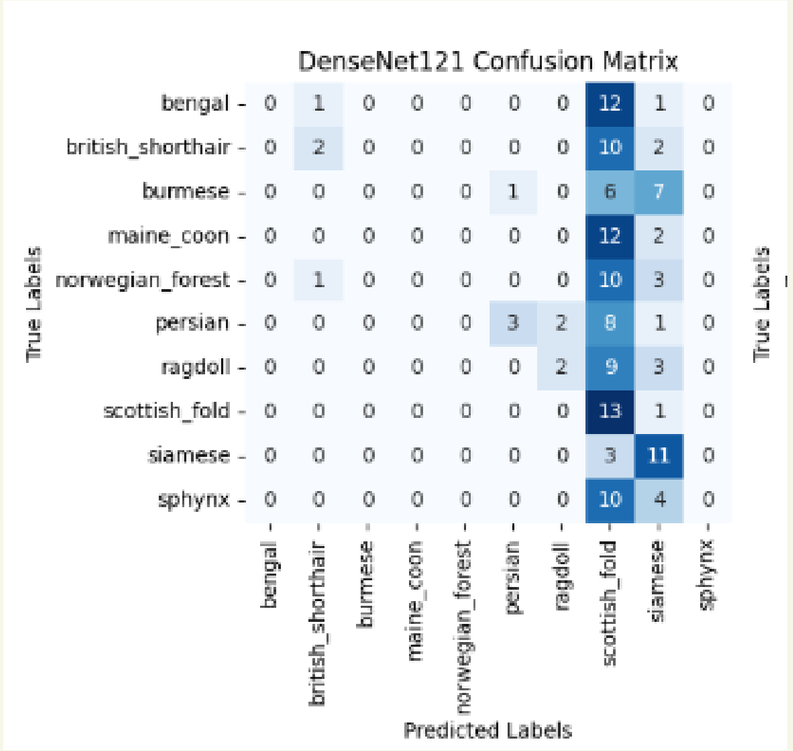
ResNet50 has decent validation accuracy but more fluctuation, indicating less stability.

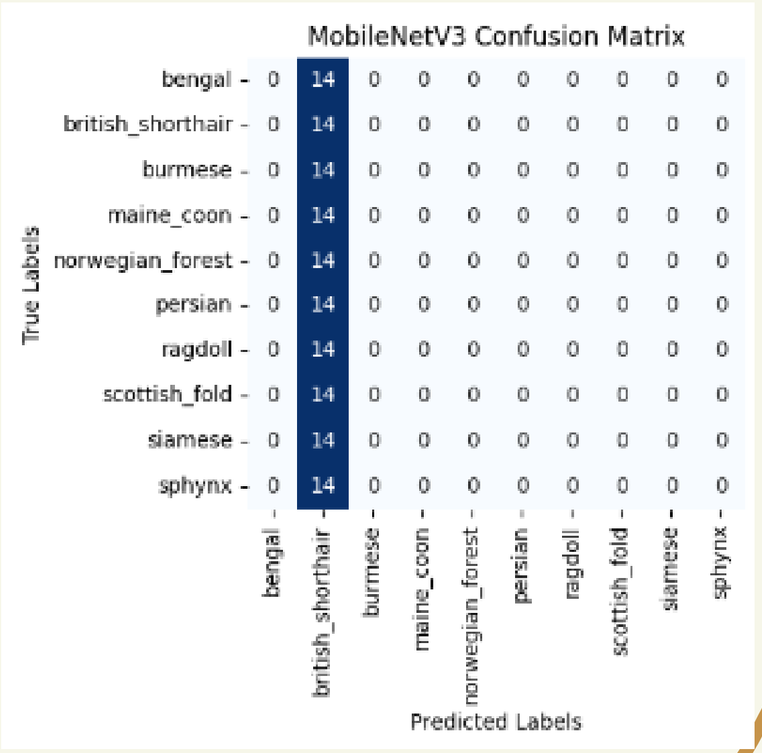
MobileNetV3Small shows the worst validation performance with high fluctuation in validation accuracy and

DATA VISUALIZATION

we create the confusion matrix to visualize the representation of the model's performance







CONCLUSION

```
ResNet50 - Accuracy:  0.85  mAP:  0.83  Training Time:  120
DenseNet121 - Accuracy:  0.87  mAP:  0.85  Training Time:  130
MobileNetV3Small - Accuracy:  0.82  mAP:  0.8  Training Time:  100

Based on accuracy, the best model is: DenseNet121
Based on mAP, the best model is: DenseNet121
Based on training time, the best model is: MobileNetV3Small
```

THANK YOU!

Sir Ahmad Zhafri Hariz Roslan