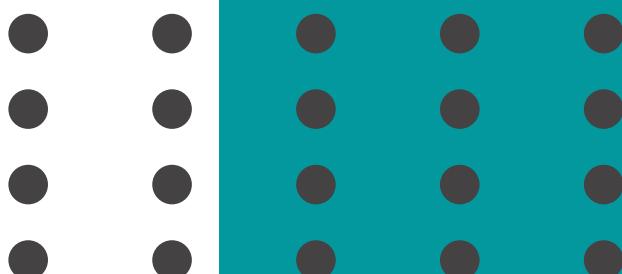


# **WEATHER ANALYSIS**

**DIGITAL IMAGE PROCESSING  
AND COMPUTER VISION**

**Ankita Anand and Godha Mandya**



## **ABOUT OUR PROJECT**

- Our project involved studying weather classification from images by using CNNs from Keras+TensorFlow
- Divided our dataset to classify 4 different types of weather (cloudy, shine, rainy, foggy)
- Transfer Learning model used: VGG16, MobileNetV2

# **DATA PREPROCESSING STEPS**

- Normalising the pixel values so the data is uniform
- Resizing and compressing the images
- Augmented the data using random transformations
  - model doesn't see the same image more than once
  - prevents overfitting

# **VGG16**

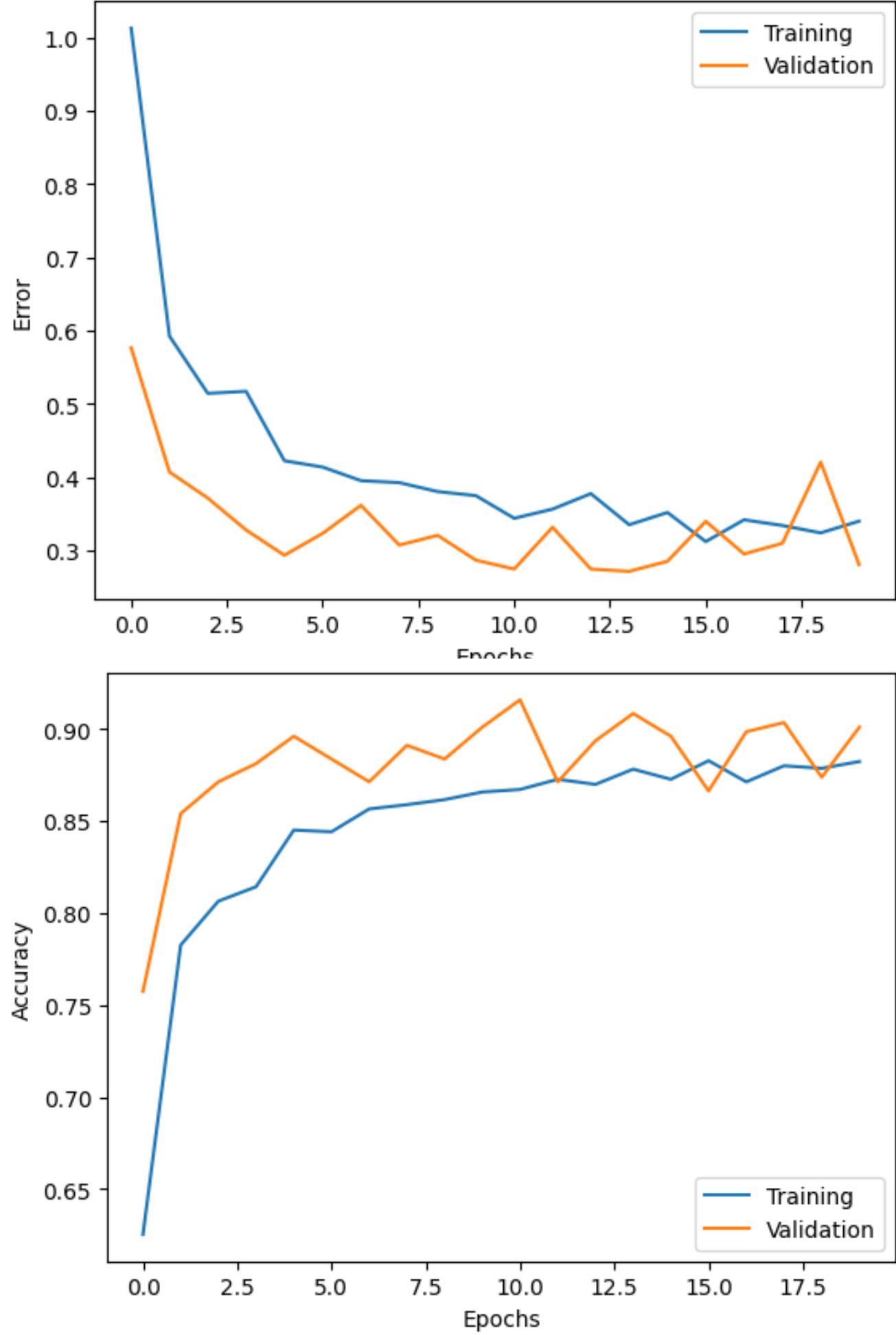
# **DATASET**



- The dataset was imported from Kaggle
- Total no. of images: 2791 (training: 2175, validation: 404, testing: 212)
- 5 classes: cloudy, rainy, foggy, shine and snow

## **WHY WE CHOSE VGG16**

- Simple structure
- Easy to train
- Occupies a small  
memory
- Prevents over-fitting



# TRAINING: VGG16

20 epochs

~500 secs per epoch

Train loss : 0.20

Train accuracy: 0.92

Val loss : 0.28

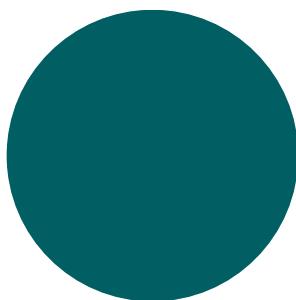
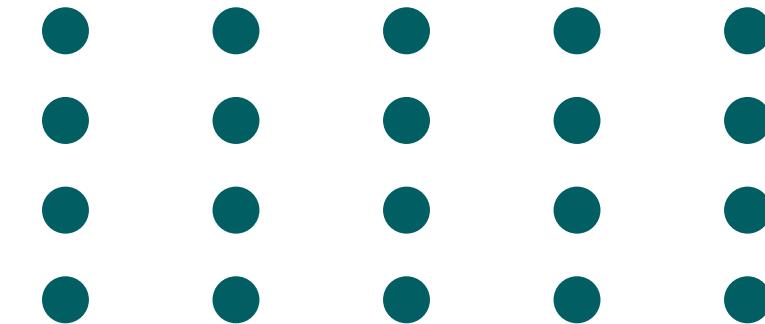
Val accuracy: 0.90

Test loss : 0.37

Test accuracy: 0.88

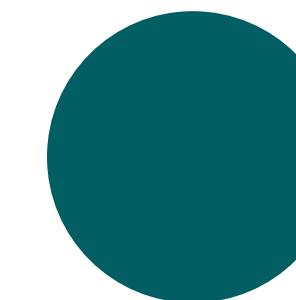
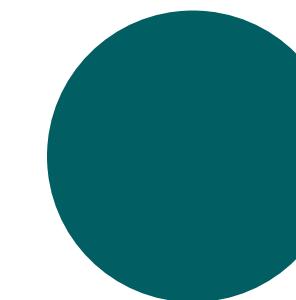
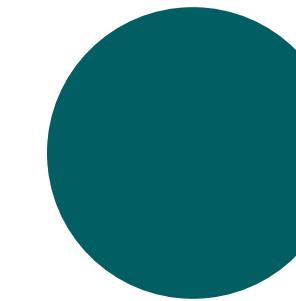


## DRAWBACKS OF VGG16



### INACCURATE TESTING

time gap in between testing and training may have caused inaccuracies



### RUNTIME

~3.5 hours for 20 epochs

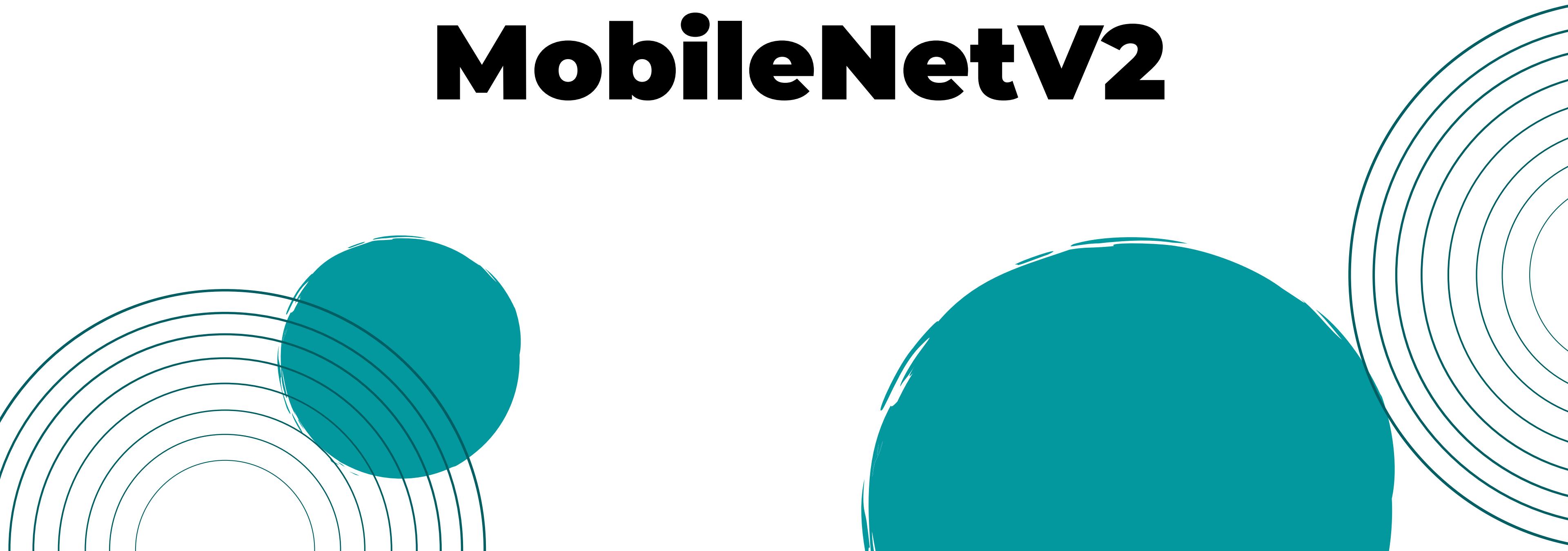
### TP/TN VALUES

our code wasn't feasible

### DATASET

no. of images in each class wasn't uniform; pics were ambiguous

# MobileNetV2



# **DATASET**

- The dataset was imported from Kaggle
- Total no. of images: 1150 (training: 920, testing: 230)
- 4 classes: cloudy, rainy, foggy & shine

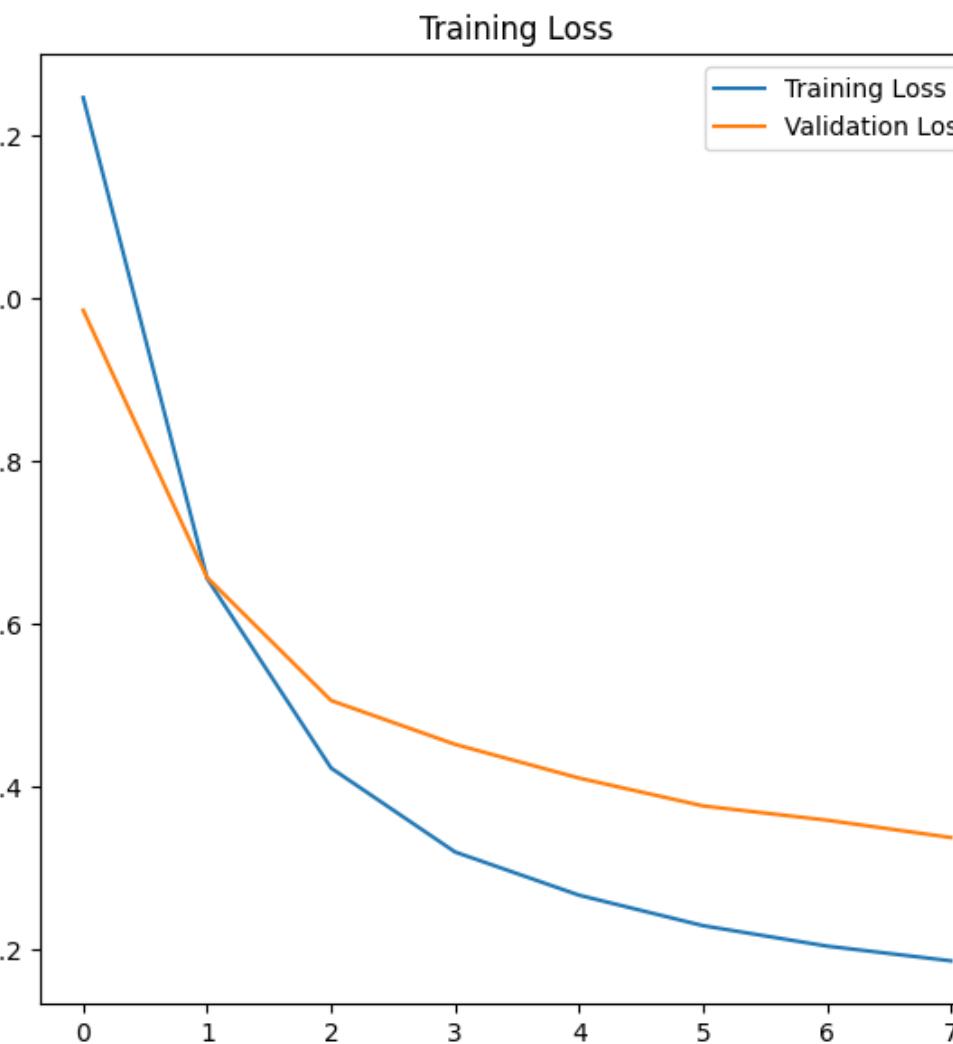
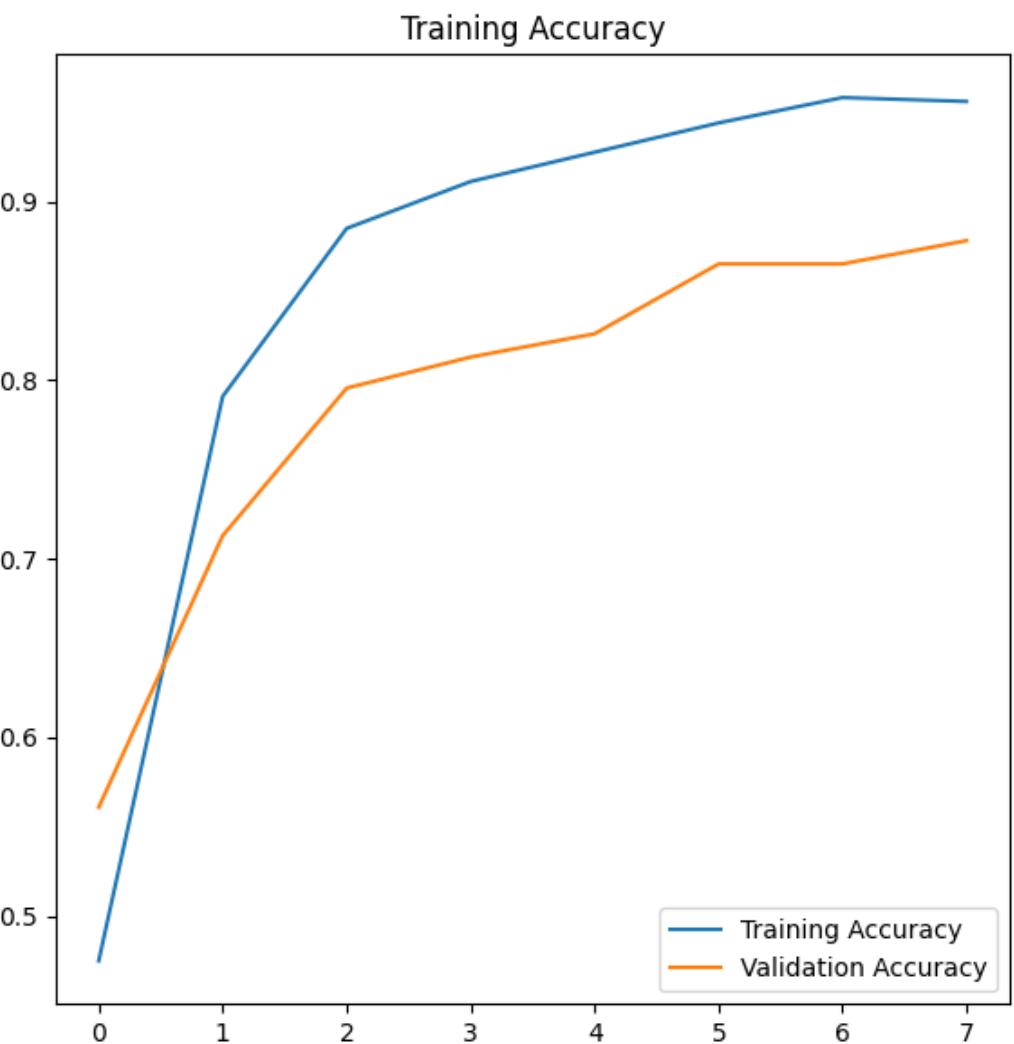


# **WHY WE CHOSE MOBILENET**

- Faster runtime
- Lightweight deep neural network
- Higher classification accuracy

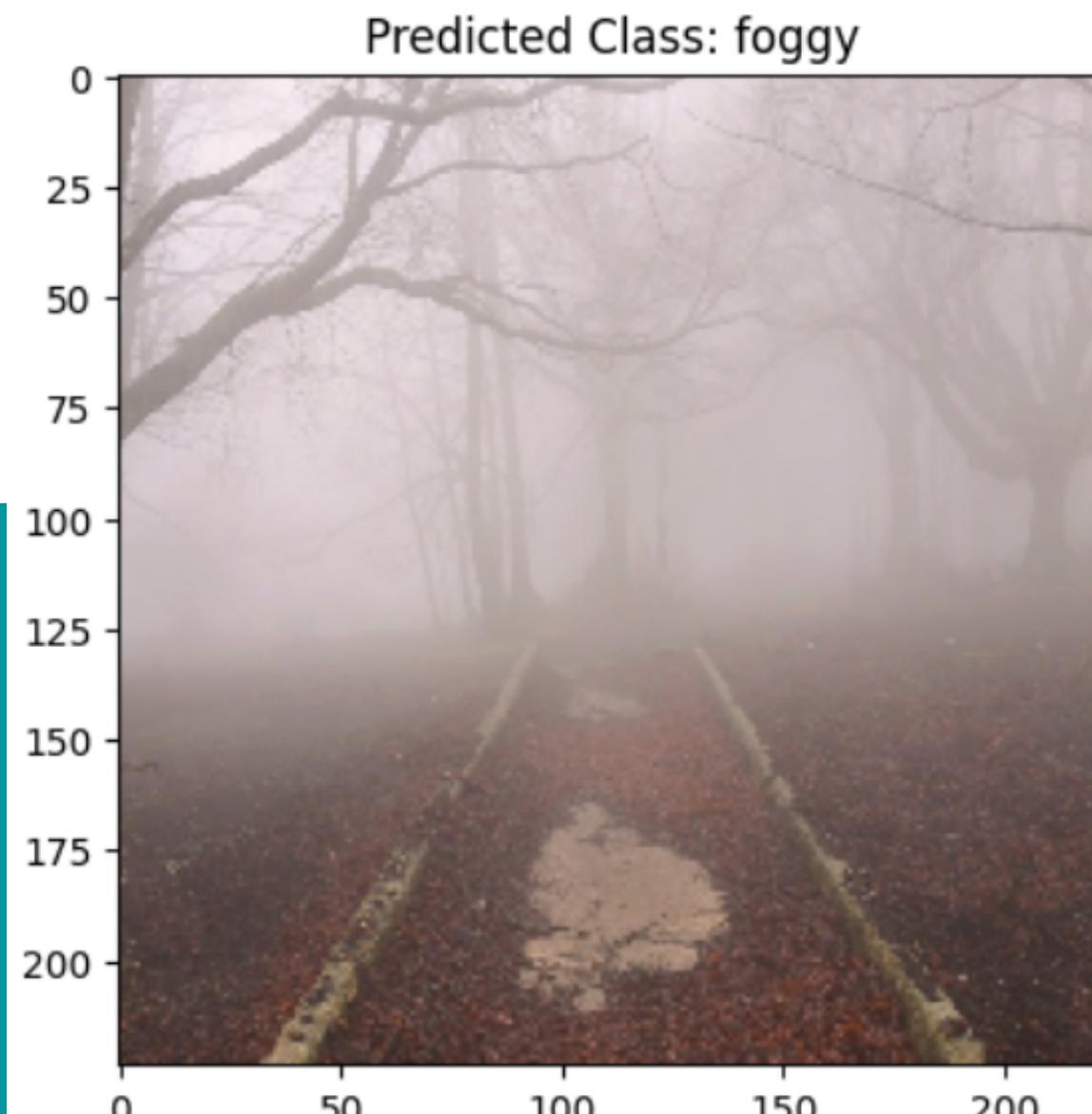
# TRAINING PROCESS

10 epochs  
~45 seconds per epoch



Train loss: 0.1682  
Train accuracy: 0.9628  
Val accuracy: 0.8783  
Val loss: 0.3516

# EVALUATION RESULTS



	precision	recall	f1-score	support
Class 0	0.87	0.90	0.89	60
Class 1	0.81	0.98	0.89	60
Class 2	0.94	0.80	0.86	60
Class 3	0.93	0.82	0.87	50
accuracy			0.88	230
macro avg	0.89	0.88	0.88	230
weighted avg	0.89	0.88	0.88	230

# EVALUATION RESULTS

**Label: cloudy**

**True Positives (TP): 54**

**True Negatives (TN): 162**

**False Positives (FP): 6**

**False Negatives (FN): 8**

**Label: foggy**

**True Positives (TP): 59**

**True Negatives (TN): 156**

**False Positives (FP): 1**

**False Negatives (FN): 14**

**Label: rainy**

**True Positives (TP): 48**

**True Negatives (TN): 167**

**False Positives (FP): 12**

**False Negatives (FN): 3**

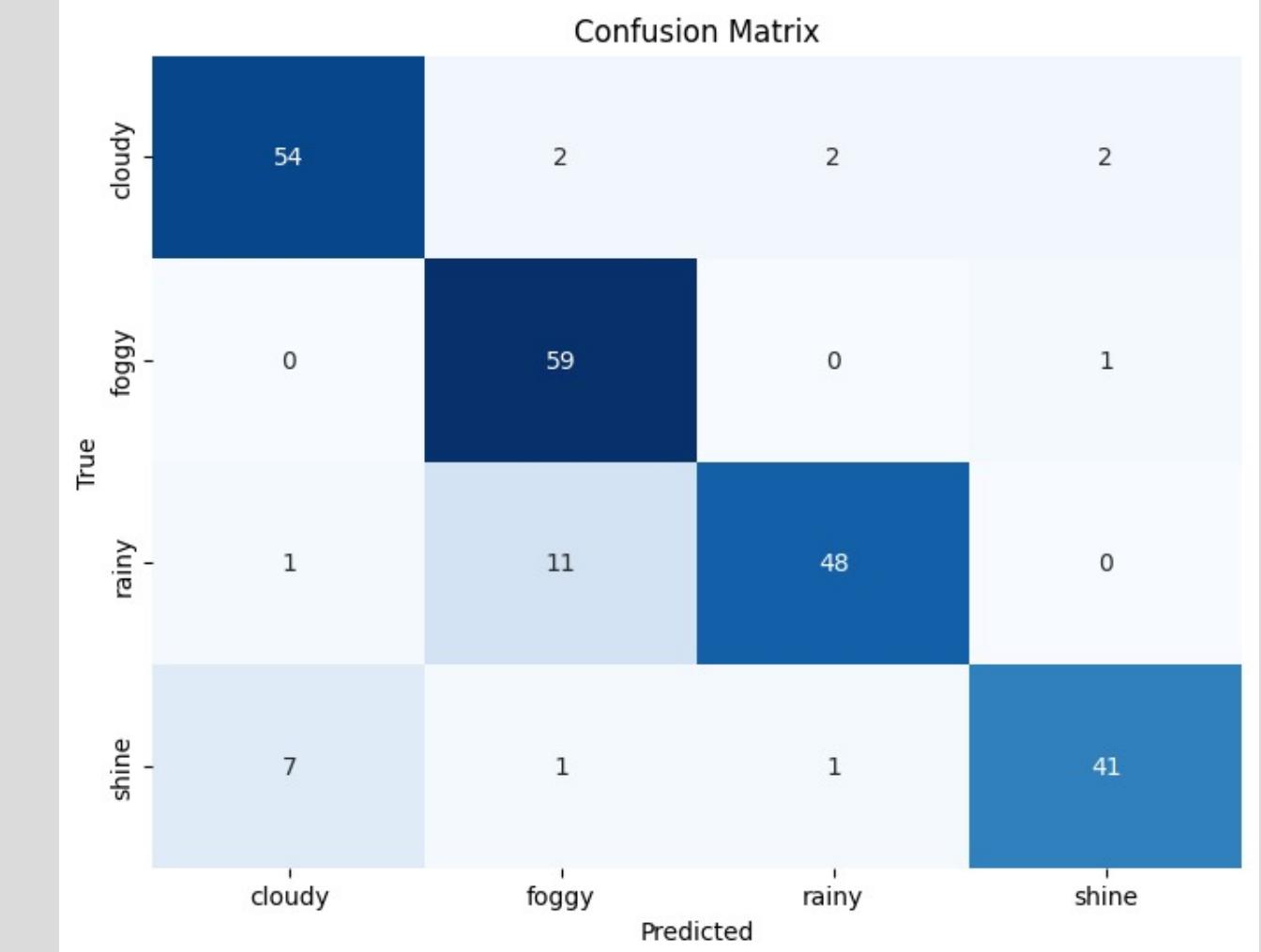
**Label: shine**

**True Positives (TP): 41**

**True Negatives (TN): 177**

**False Positives (FP): 9**

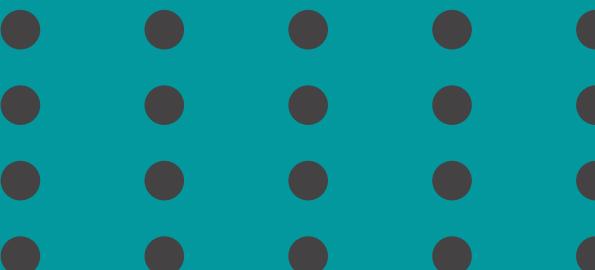
**False Negatives (FN): 3**



# **CHALLENGES FACED**

**Acquiring the dataset  
with suitable images**

**Over-fitting**



# APPLICATIONS

- Improve agricultural planning
- Check air traffic and marine forecasts

- Vehicle assistant driving systems
- Used to optimise travel and make it safer

- Severe weather alerts and advisories
- Military applications

# REFERENCES AND DOCUMENTATION

**Documentation:**

**MobileNetv2:**

[https://colab.research.google.com/drive/12QZocC5EQIW3CFXLyLjgjDmoDw5cx7nA?  
usp=sharing](https://colab.research.google.com/drive/12QZocC5EQIW3CFXLyLjgjDmoDw5cx7nA?usp=sharing)

**VGG16:**

[https://colab.research.google.com/drive/1kaJGX9rcjtJFdt8kJ2hn\\_wp3\\_IdwomcD?usp=sharing](https://colab.research.google.com/drive/1kaJGX9rcjtJFdt8kJ2hn_wp3_IdwomcD?usp=sharing)

**References:**

<https://www.kaggle.com/datasets/vijaygiitk/multiclass-weather-dataset>

<https://www.kaggle.com/datasets/jehanbhathena/weather-dataset>

<https://ur vog.medium.com/weather-image-classification-with-keras-4eee9468ff2f>

[https://colab.research.google.com/drive/1kaJGX9rcjtJFdt8kJ2hn\\_wp3\\_IdwomcD?usp=sharing](https://colab.research.google.com/drive/1kaJGX9rcjtJFdt8kJ2hn_wp3_IdwomcD?usp=sharing)

# **THANK YOU!**

