

# Enhancing Karooooo's AI Dashcams with Convolution Neural Networks

A Vision for Karooooo



Presented by Matthew Bowyer – UOEO



# From:

2025-07-12 17:42:18 / -25.7479, 28.2293 / -25.7479, 28.2293 / Karooooo Vision AI – Front Cam





# TO:

- ✓ Faster Reaction Time
- ✓ Reduced Mental Load
- ✓ Improved Safety
- ✓ Enhanced Fleet Monitoring
- ✓ Market Differentiation

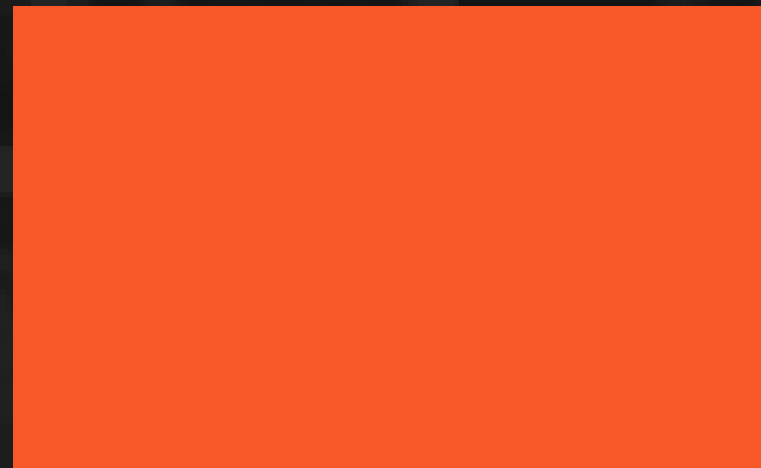
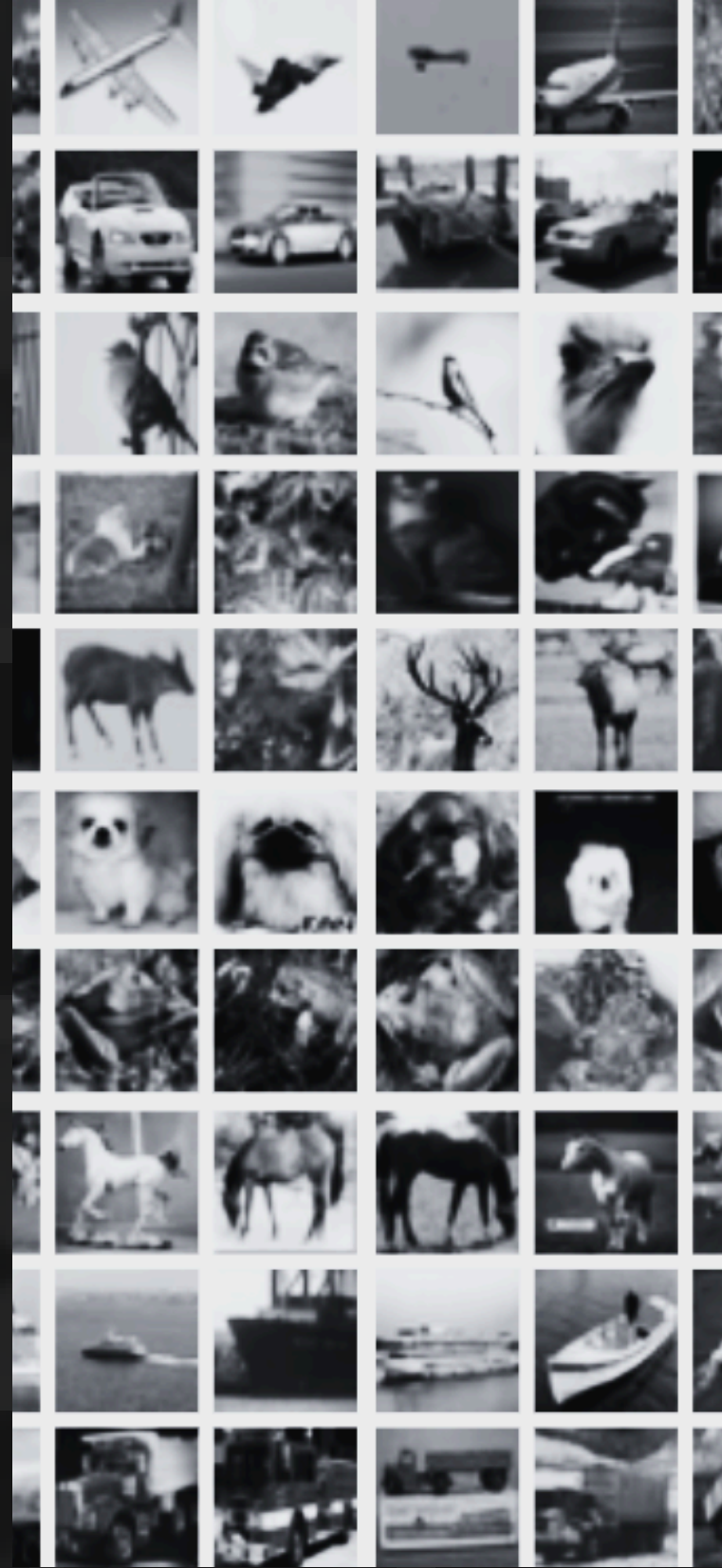


# Data set overview

## CIFAR-10

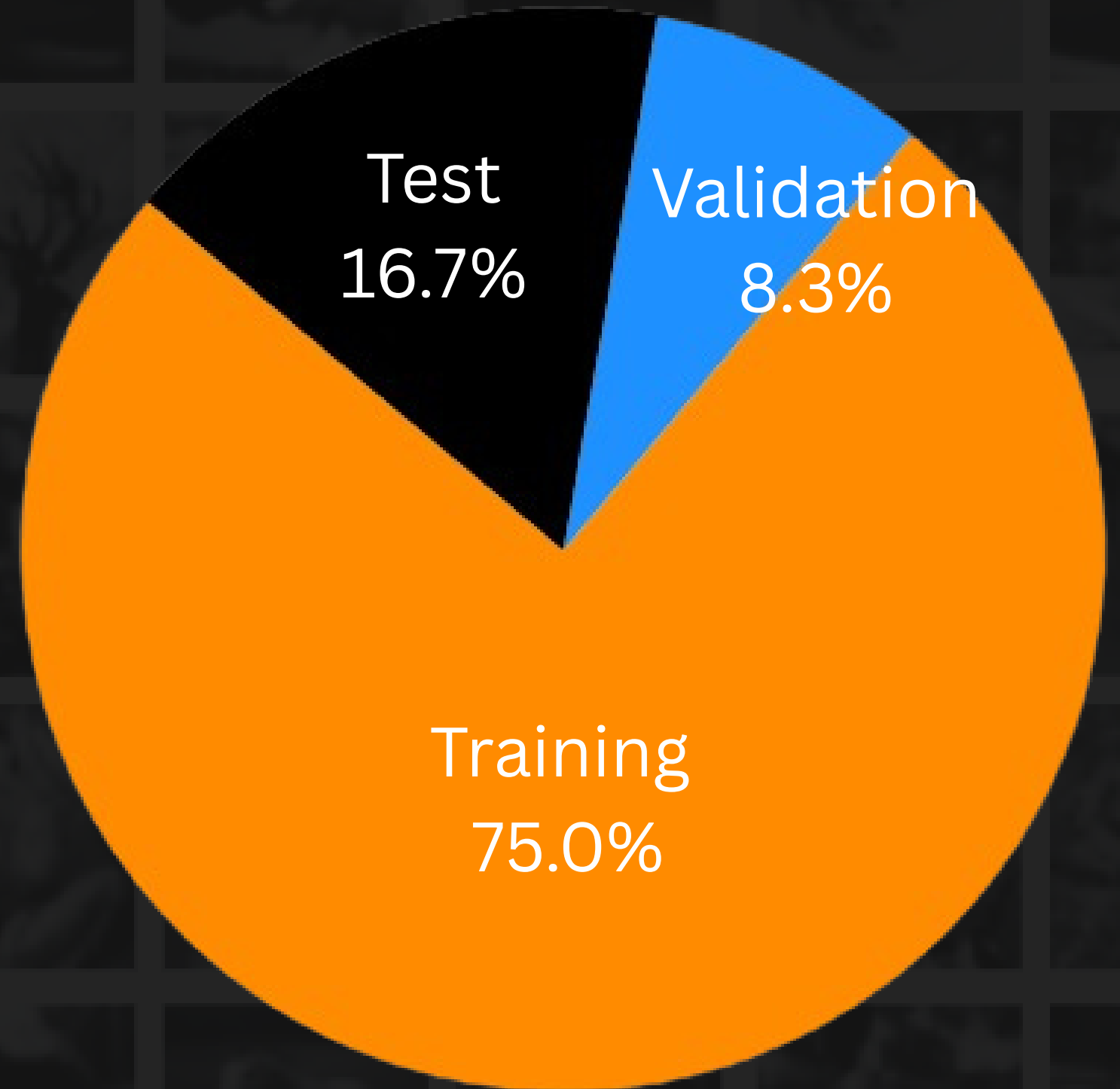






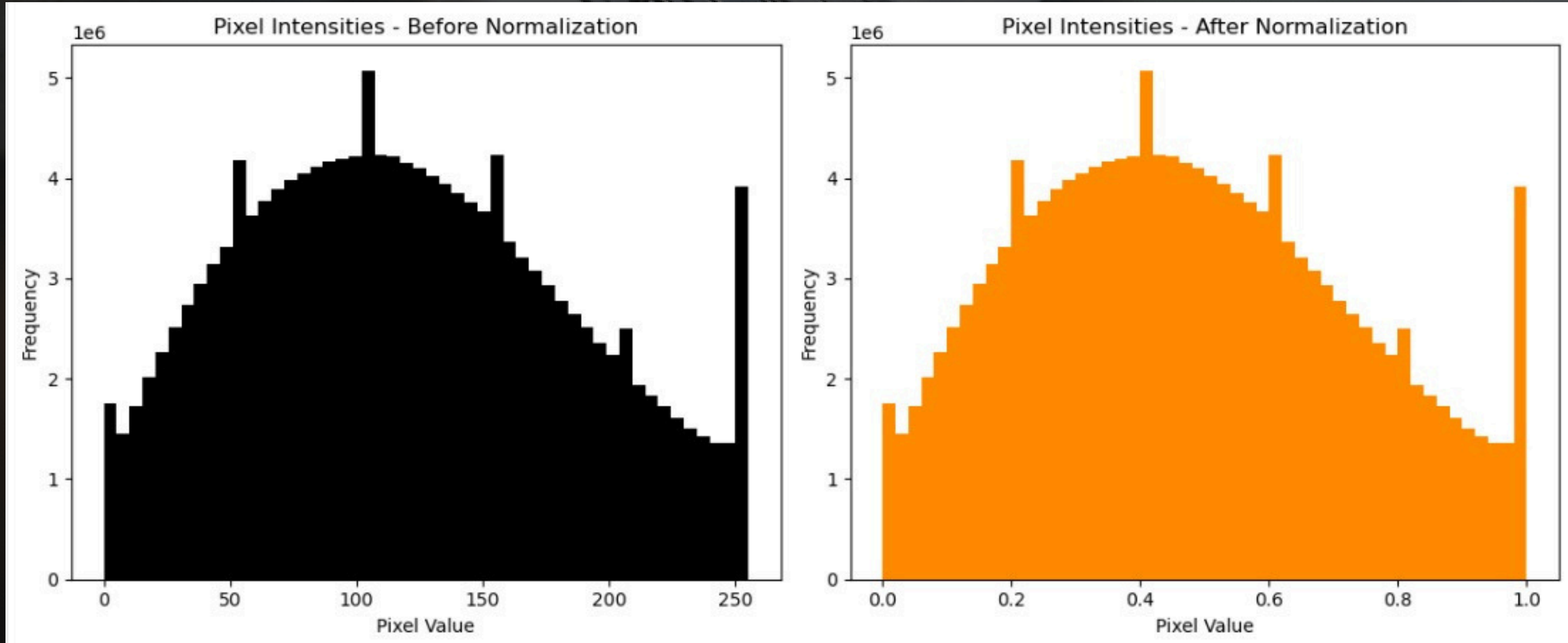
# Dataset

Split by Image Count



# Pixel Intensities

## Pre and Post Normalization





# One-hot encoding

**Original**

Gender
Male
Female
Male
Male



**One-hot encoded**

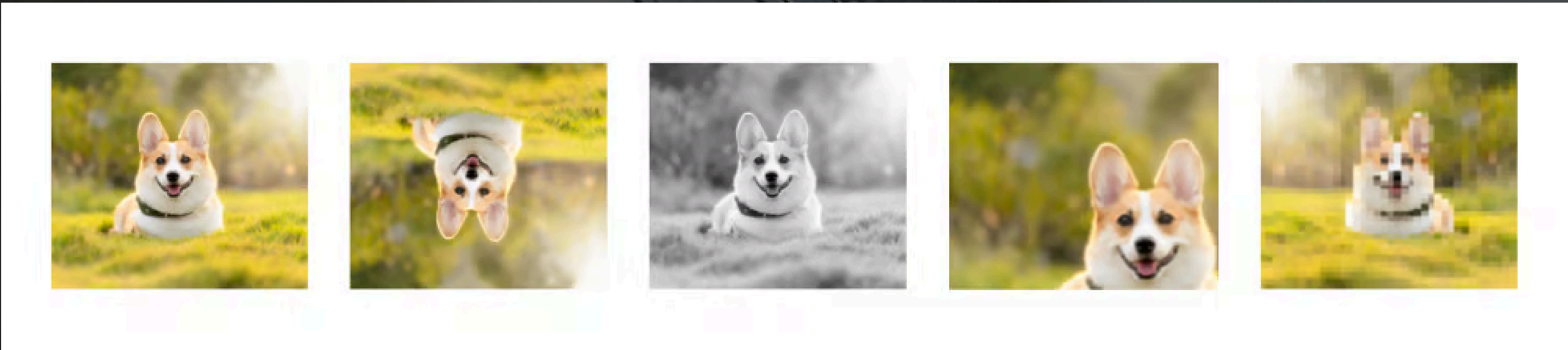
Gender	Male	Female
Male	1	0
Female	0	1
Male	1	0
Male	1	0





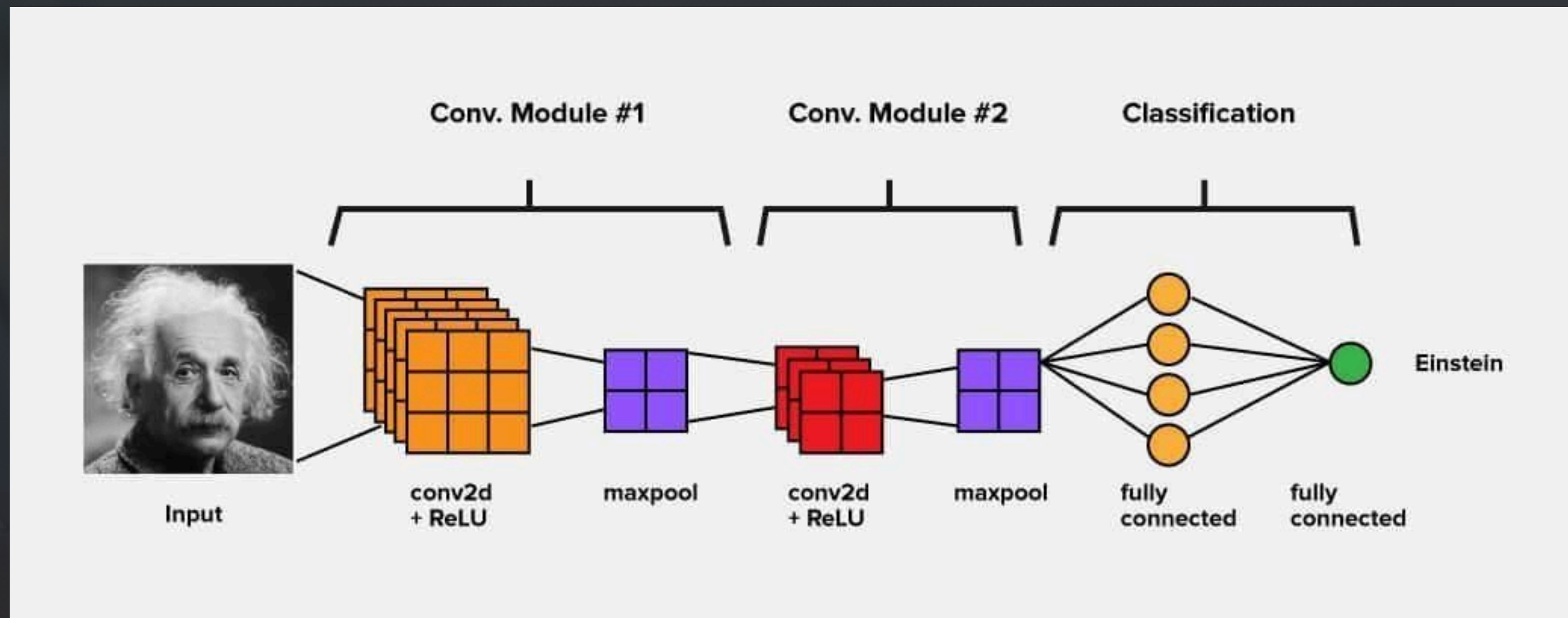


# Data Augmentation





# Convolution Neural Networks (CNN)



### Model 1

Simple model

No Transfer Learning

- RGB images, 32x32 input layer
  - Adam optimizer
  - Categorical cross entropy
  - ReLU in all hidden layers
- Final dense layer activated by SoftMax

30 epochs

800 000 trainable parameters

Batch size 128

Learning rate 0.001

### Model 2

MobileNetV2

Transfer Learning

- RGB images, 32x32 input layer
  - Adam optimizer
  - Categorical cross entropy
  - ReLU in all hidden layers
- Final dense layer activated by SoftMax

25 epochs

2.3 million trainable parameters

Batch size 96

Learning rate 0.001

### Model 3

ResNet-50

Transfer Learning

- RGB images, 32x32 input layer
  - Adam optimizer
  - Categorical cross entropy
  - ReLU in all hidden layers
- Final dense layer activated by SoftMax

20 epochs

23 million trainable parameters

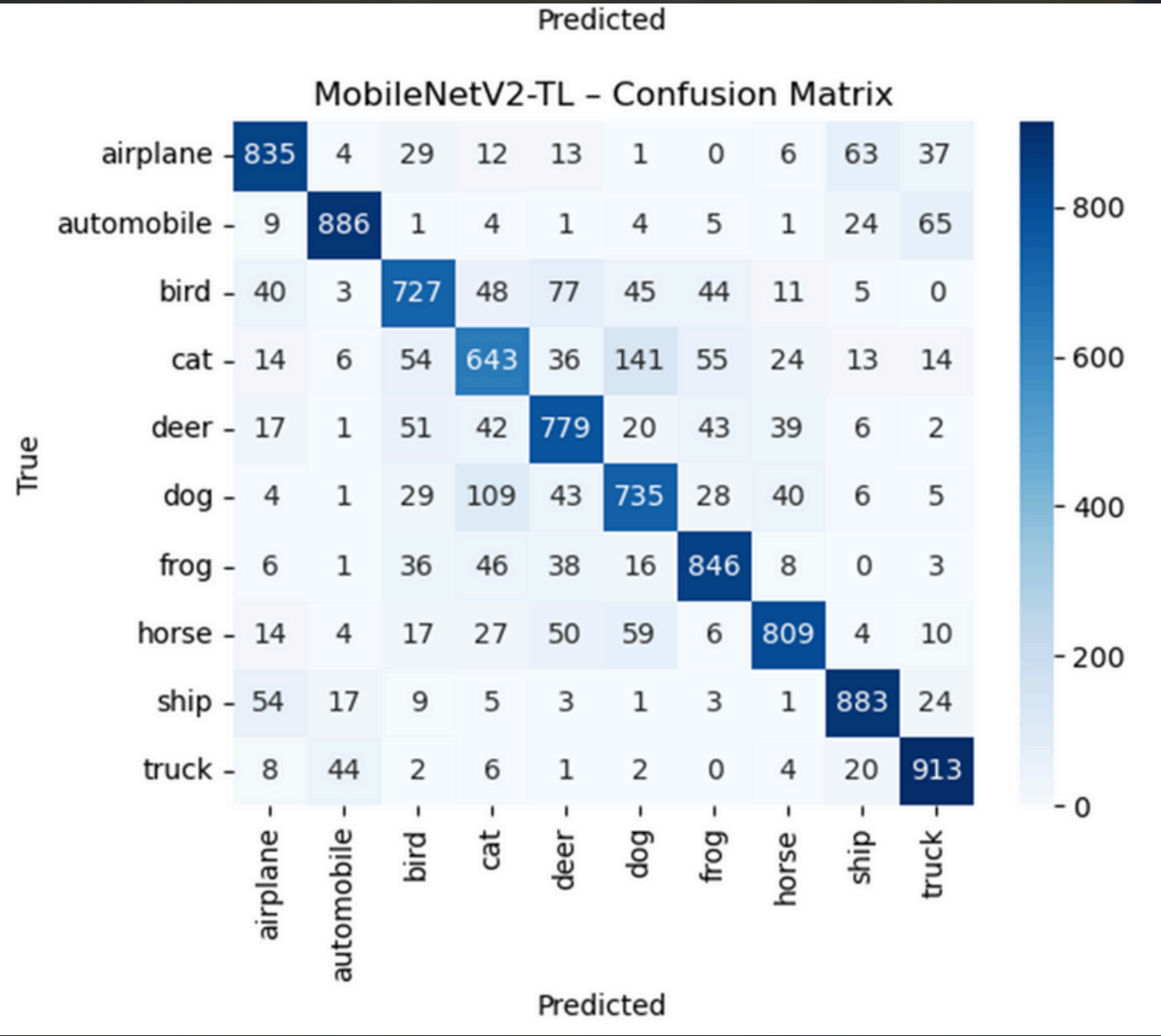
Batch size 64

Learning rate 0.0005



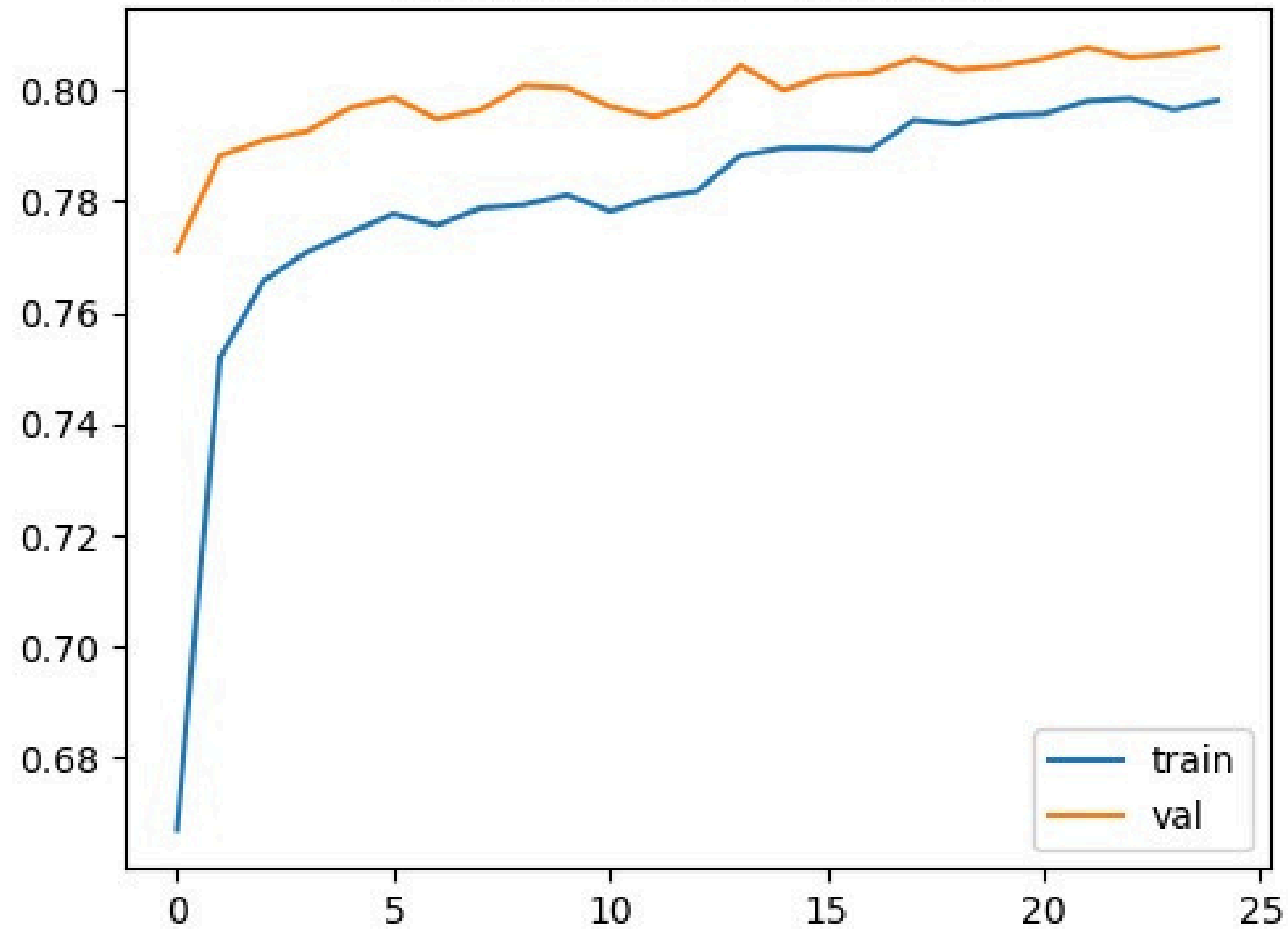
# Model Evaluation

Measurement	Model 1	Model 2	Model 3
Accuracy	69%	81%	32%
Precision	70%	81%	34%
Recall	69%	81%	32%
F1 Score	69%	81%	29%
MCC	0.66	0.78	0.25

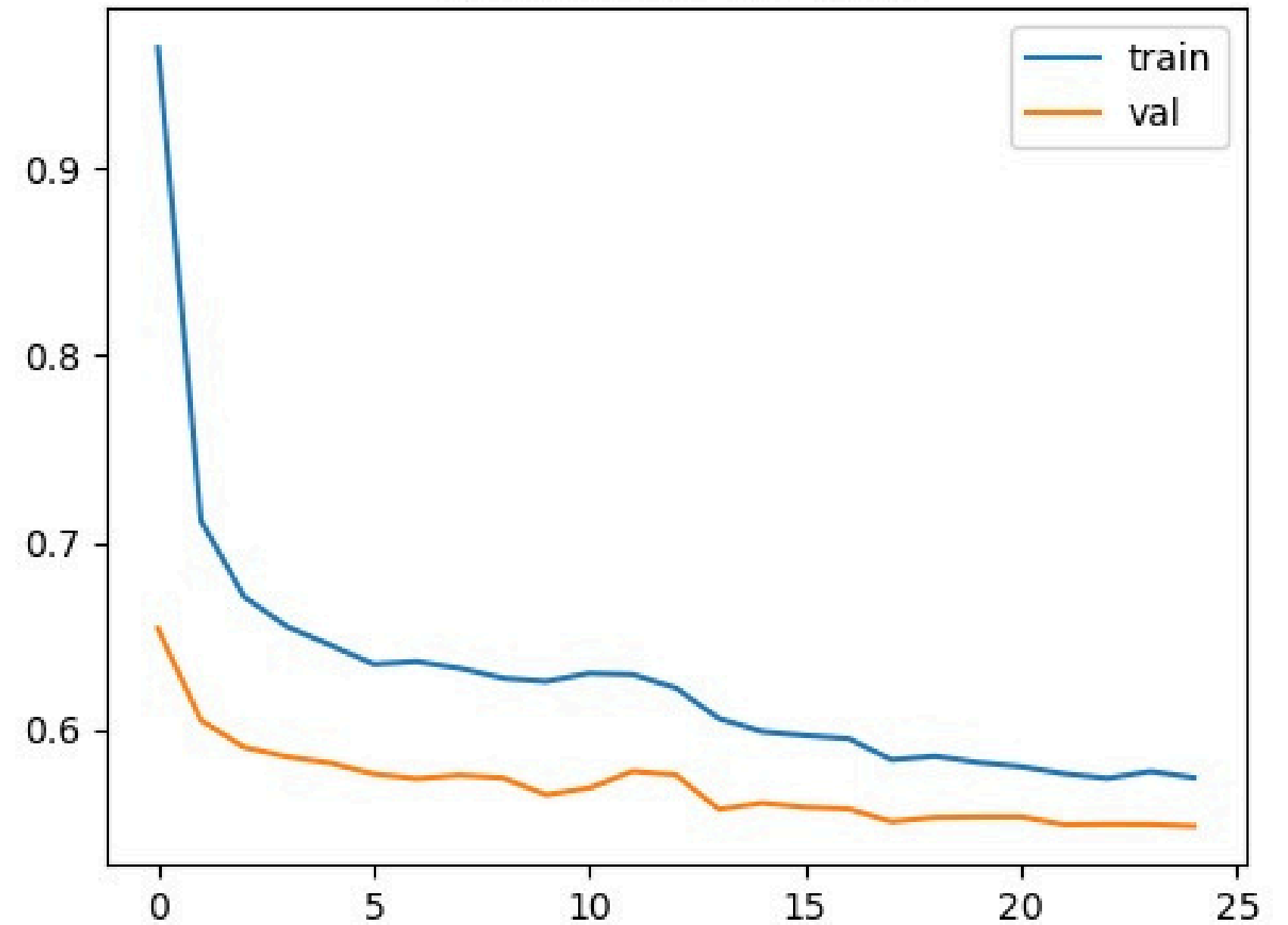


# Model Evaluation

MobileNetV2-TL - Accuracy



MobileNetV2-TL - Loss







# Thank You

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- <https://images.app.goo.gl/Y9mwUFNKjuyDNVB2A>
- <https://sl.bing.net/jTGqkz44D3A>
- <https://sl.bing.net/kSoLy1Si7c4>
- <https://www.cs.toronto.edu/~kriz/cifar.html#:~:text=CIFAR-10%20python%20version>
- <https://sl.bing.net/kgennB6ZMuO>