

Dog Breed Classifier Project Overview





Background

- Passionate dog lovers.
- Decided to focus on classifying breeds.
- Initially aimed to predict mixed breeds but shifted to pure breed due to data limitations.
- Data sourced from **Stanford Dogs Dataset**.

Background

80,000,000 dogs
worldwide

Dogs are a beloved pet around the world

300+

Over 300 dog breeds

1.2 million

dogs registered since the establishment of the Israeli Center for Dog
Registration

604,874 dogs

updated in the database last year.

Dog Breed Classifier Project



Background Overview

Statistics, why we chose this project, data background



Data Exploration and Visualizations

Understanding the data



Preprocessing

Data preparation for analysis or modeling



Group 1 Model & Conclusion

MobileNetV2 model. Accuracy of 0.83



Group 2 Model & Conclusion

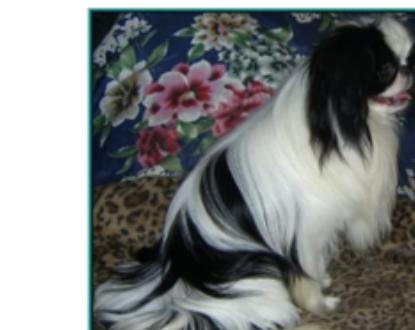
InceptionResNetV2 model. Accuracy of 0.86



Summary & Future Steps

Data Exploration and Visualizations

Examples of Images from the data:



Stanford Dogs Dataset:

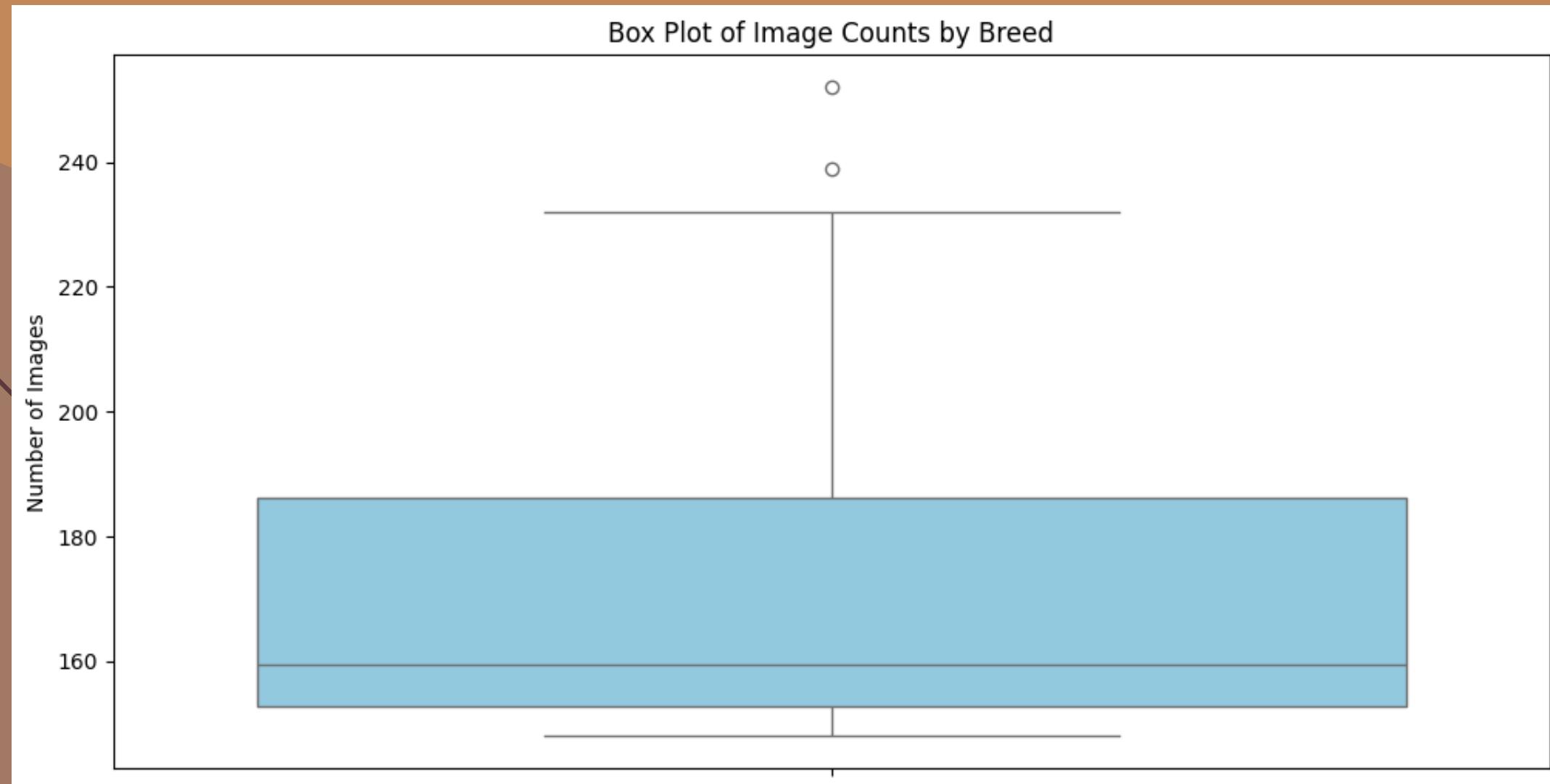
- 20,580 Images (with annotations)
- 120 Breeds

Data Exploration and Visualizations

Example of the Annotation:

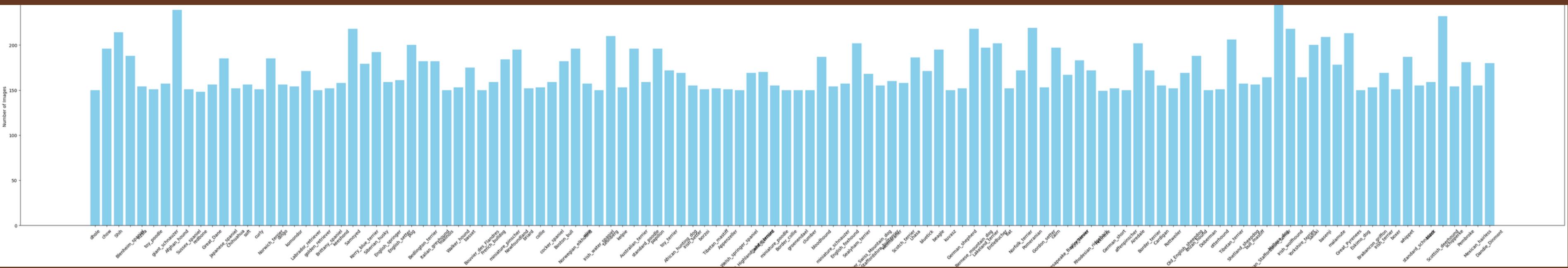
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<annotation>
    <folder>02085620</folder>
    <filename>n02085620_7</filename>
    <source>
        <database>ImageNet database</database>
    </source>
    <size>
        <width>250</width>
        <height>188</height>
        <depth>3</depth>
    </size>
    <segment>0</segment>
    <object>
        <name>Chihuahua</name>
        <pose>Unspecified</pose>
        <truncated>0</truncated>
        <difficult>0</difficult>
        <bndbox>
            <xmin>71</xmin>
            <ymin>1</ymin>
            <xmax>192</xmax>
            <ymax>180</ymax>
        </bndbox>
    </object>
</annotation>
```

Data Exploration and Visualizations



Basic Data Exploration:
Minimum number of images: 148
Maximum number of images: 252
Mean number of images: 171.5
Median number of images: 159.5

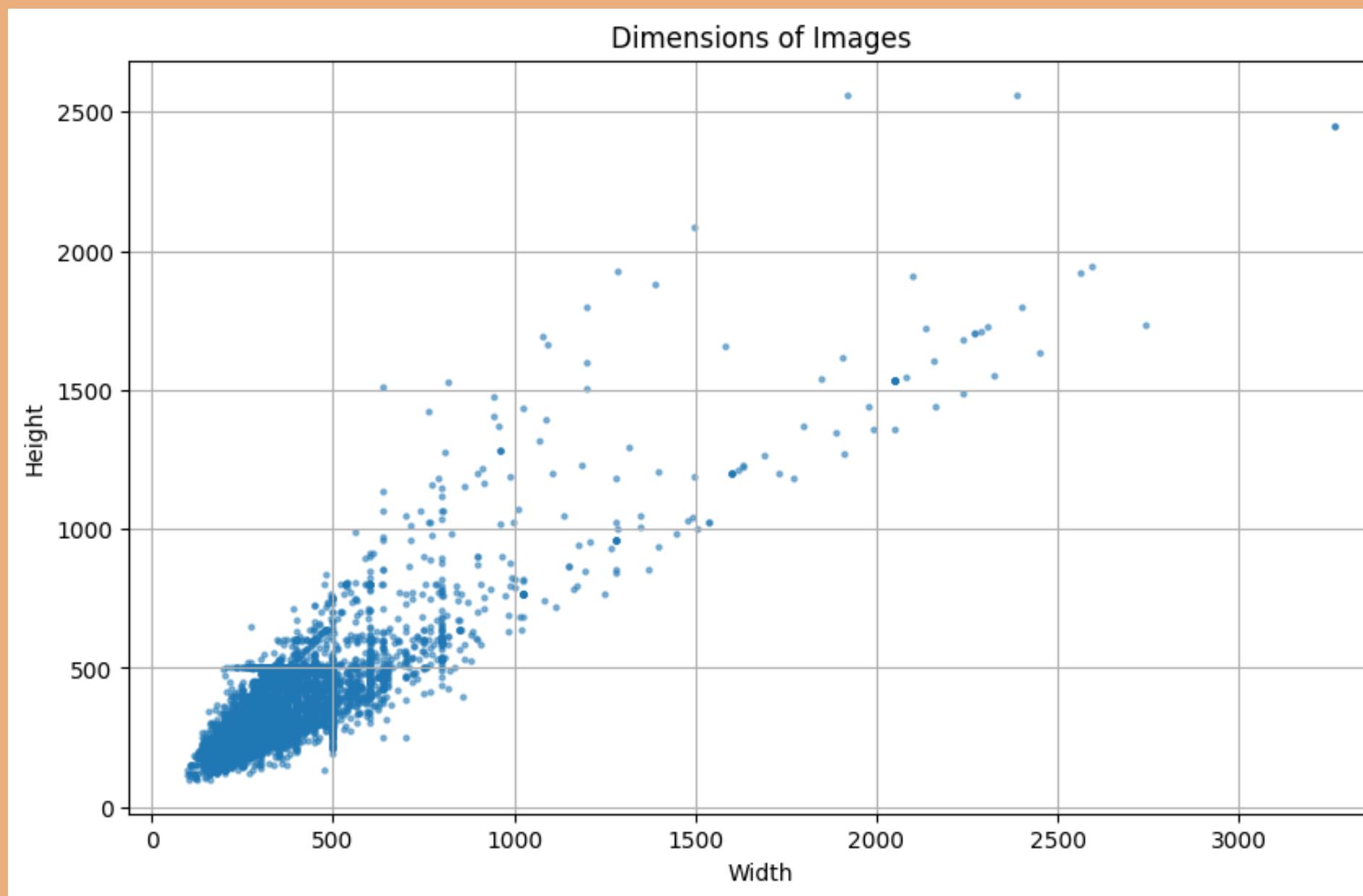
Data Exploration and Visualizations



Distribution of the number of images and the dog breed (150-250)

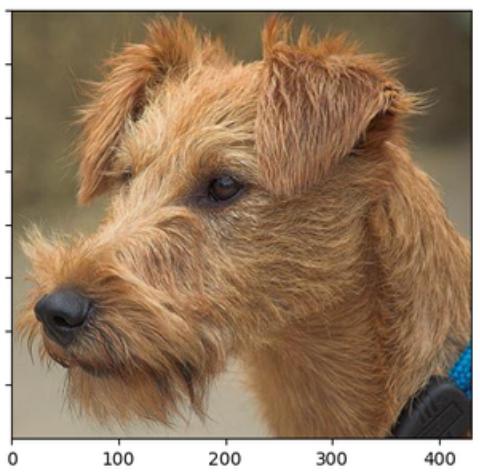
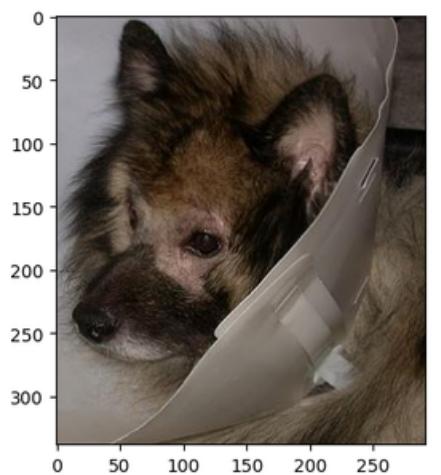
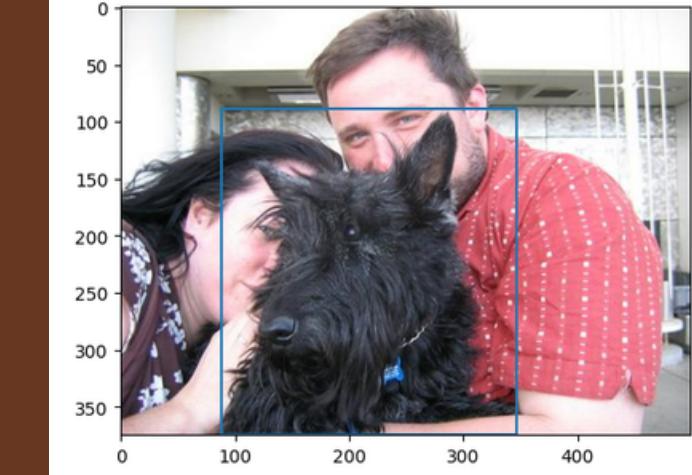
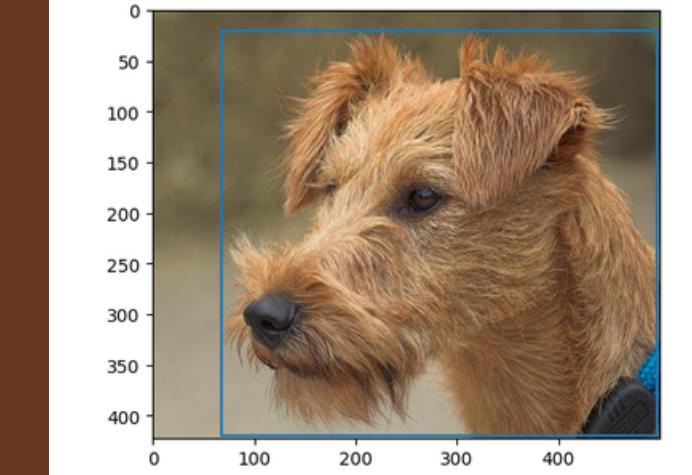
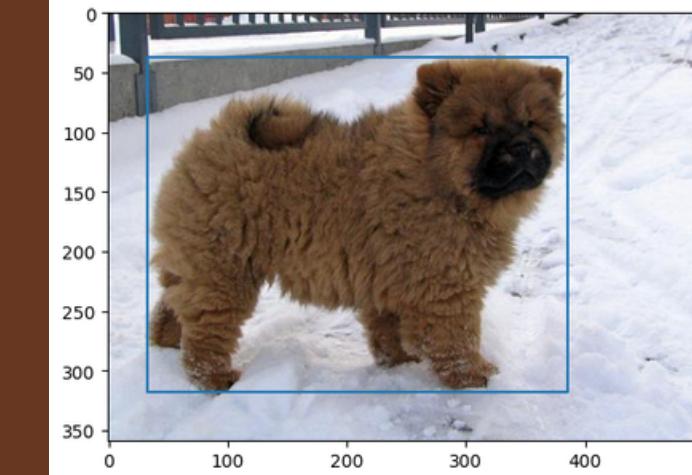
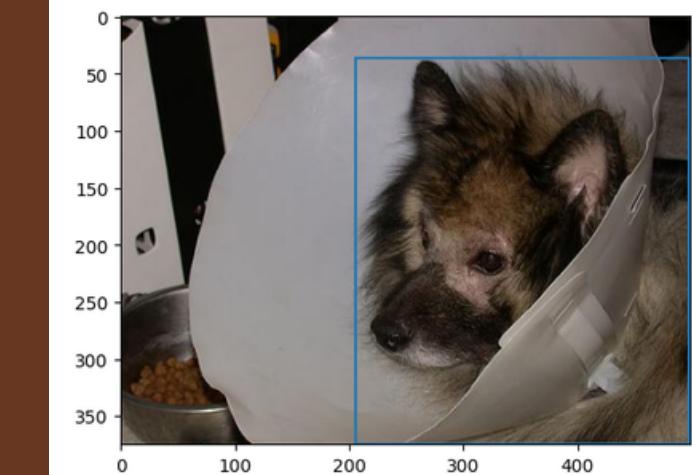
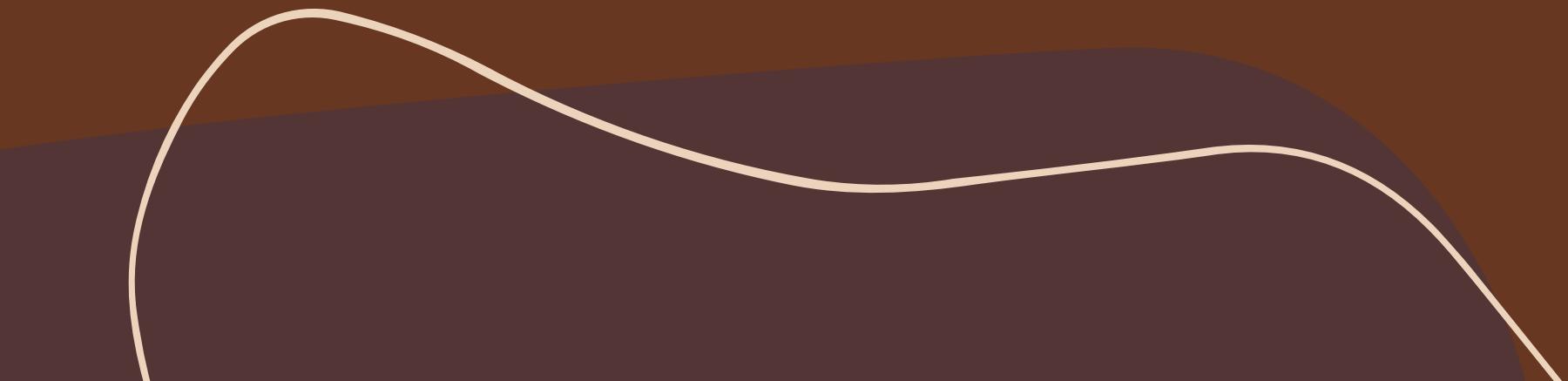
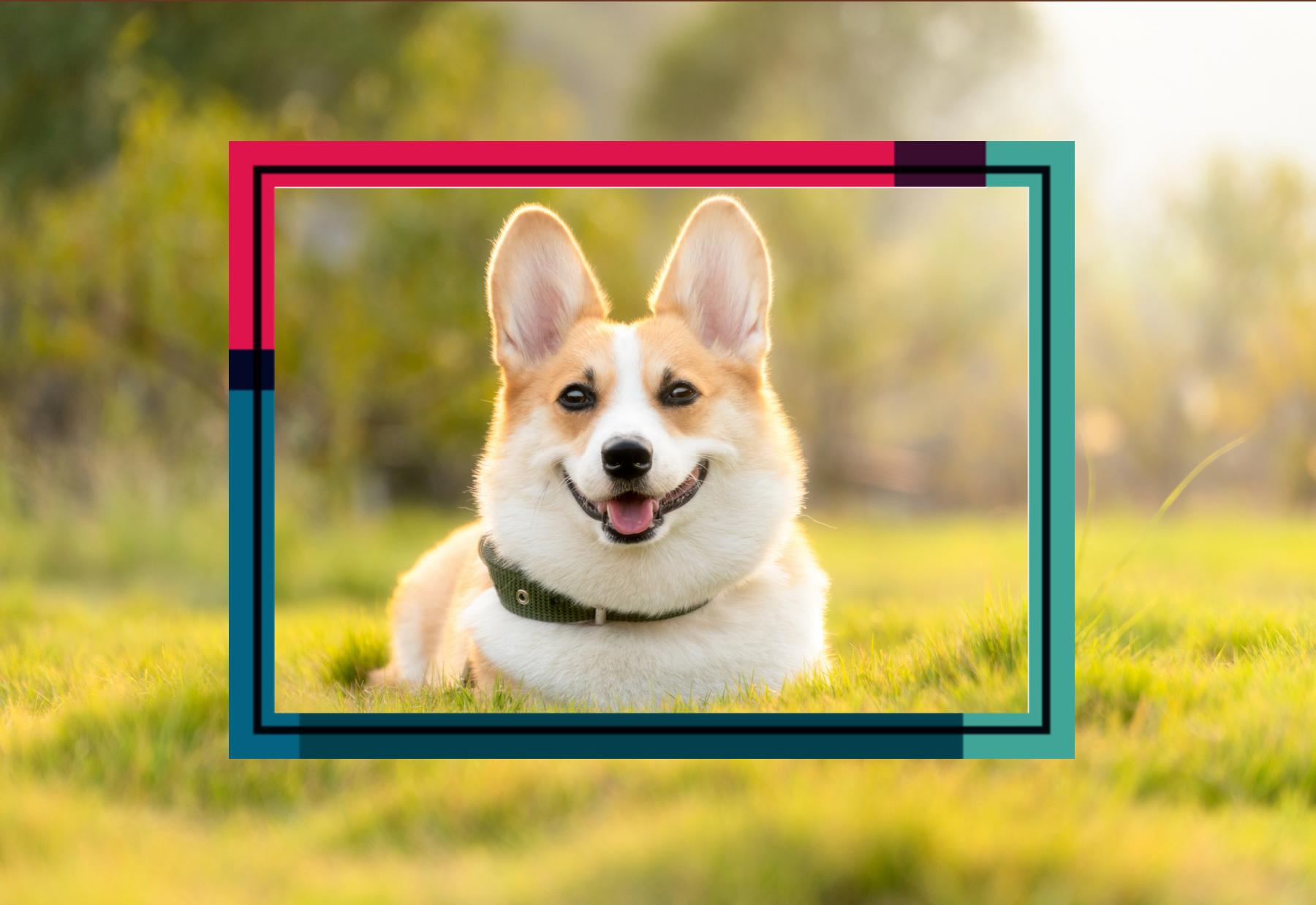
Data Exploration and Visualizations

Dimensions of images



Preprocessing

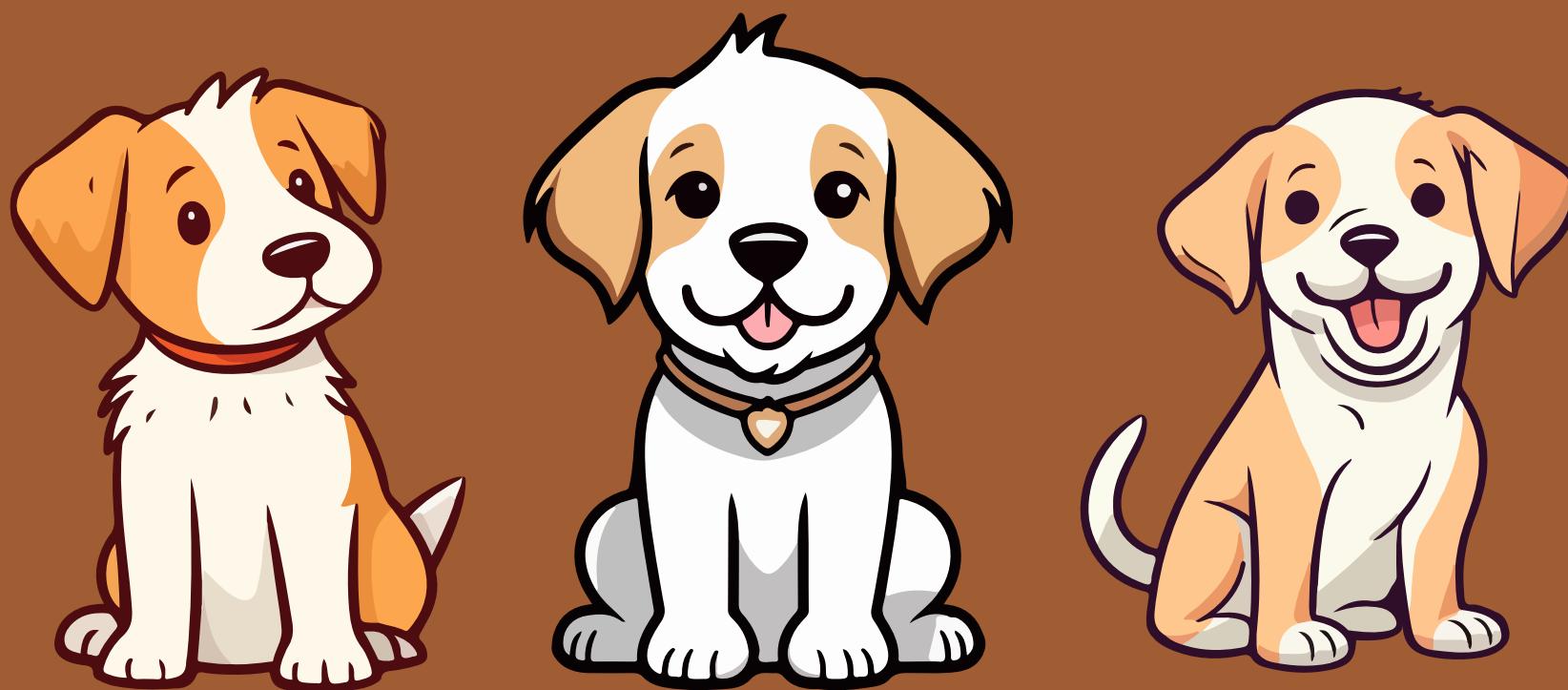
Cropping the images



Preprocessing



- Normalized and resized images.
- Encoded labels using one-hot encoding.



Model Group 1:

why MobileNetV2_130_224?



- Lightweight architecture
- High accuracy compared to larger and more computationally expensive models
- The model's small size enables faster inference times, making it suitable for real-time applications.
- Pre-trained on datasets like ImageNet for optimized performance.

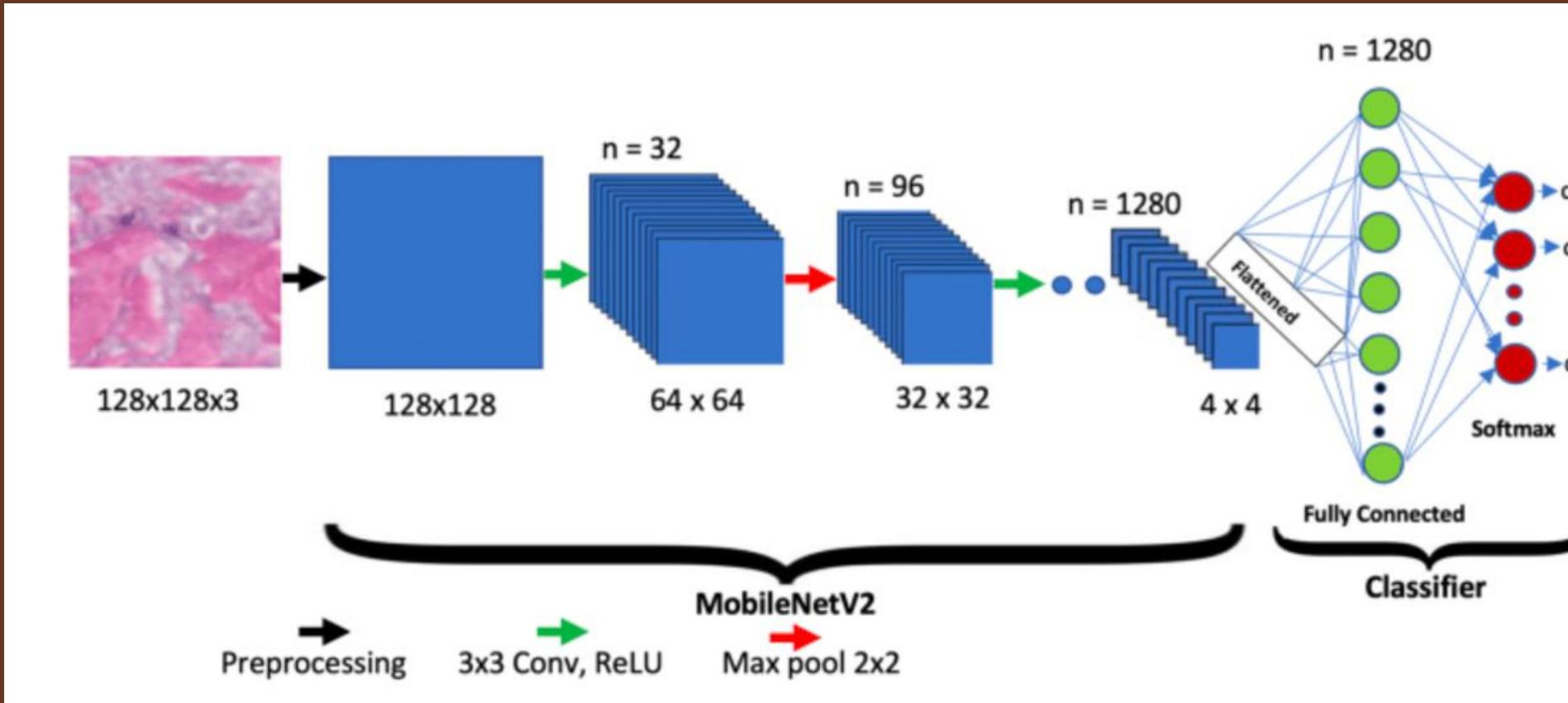
Model Group 1:

Selecting & Preparing The Model

- Explored multiple models; selected **MobileNetV2_130_224**.
- Specifically trained for image classification with a size of **224x224**.
- Balances computation time with accuracy.
- Continued preprocessing the data to fit the model, converting to **tensors** and normalizing pixels.
- Defined batch size (32) and epochs (10) for training.

Model Group 1:

MobileNetV2_130_224



```
Building model with: https://tfhub.dev/google/imagenet/mobilenet\_v2\_130\_224/classification/4
Model: "sequential"

Layer (type)                  Output Shape           Param #
=====                      =====
keras_layer (KerasLayer)      (None, 1001)          5432713
dense (Dense)                 (None, 120)           120240
=====
Total params: 5552953 (21.18 MB)
Trainable params: 120240 (469.69 KB)
Non-trainable params: 5432713 (20.72 MB)
```

Model Group 1:

Model Performance Analysis

- Achieved validation scores between 0.83-0.84 and 0.83 on test data.
- Absence of overfitting inferred from the close scores.



Model Group 1:

Model Performance Analysis

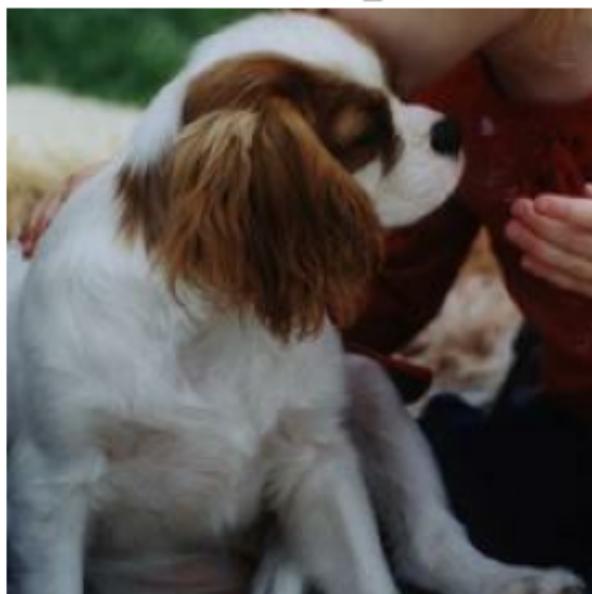
Predicted: leonberg
True: leonberg



Predicted: tibetan_mastiff
True: tibetan_mastiff



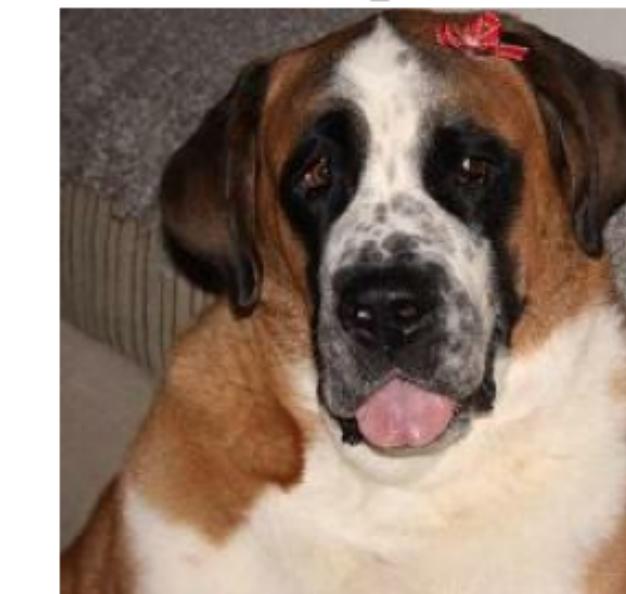
Predicted: blenheim_spaniel
True: blenheim_spaniel



Predicted: toy_poodle
True: toy_poodle



Predicted: saint_bernard
True: saint_bernard



Predicted: whippet
True: whippet



Predicted: bull_mastiff
True: newfoundland



Predicted: pomeranian
True: pomeranian

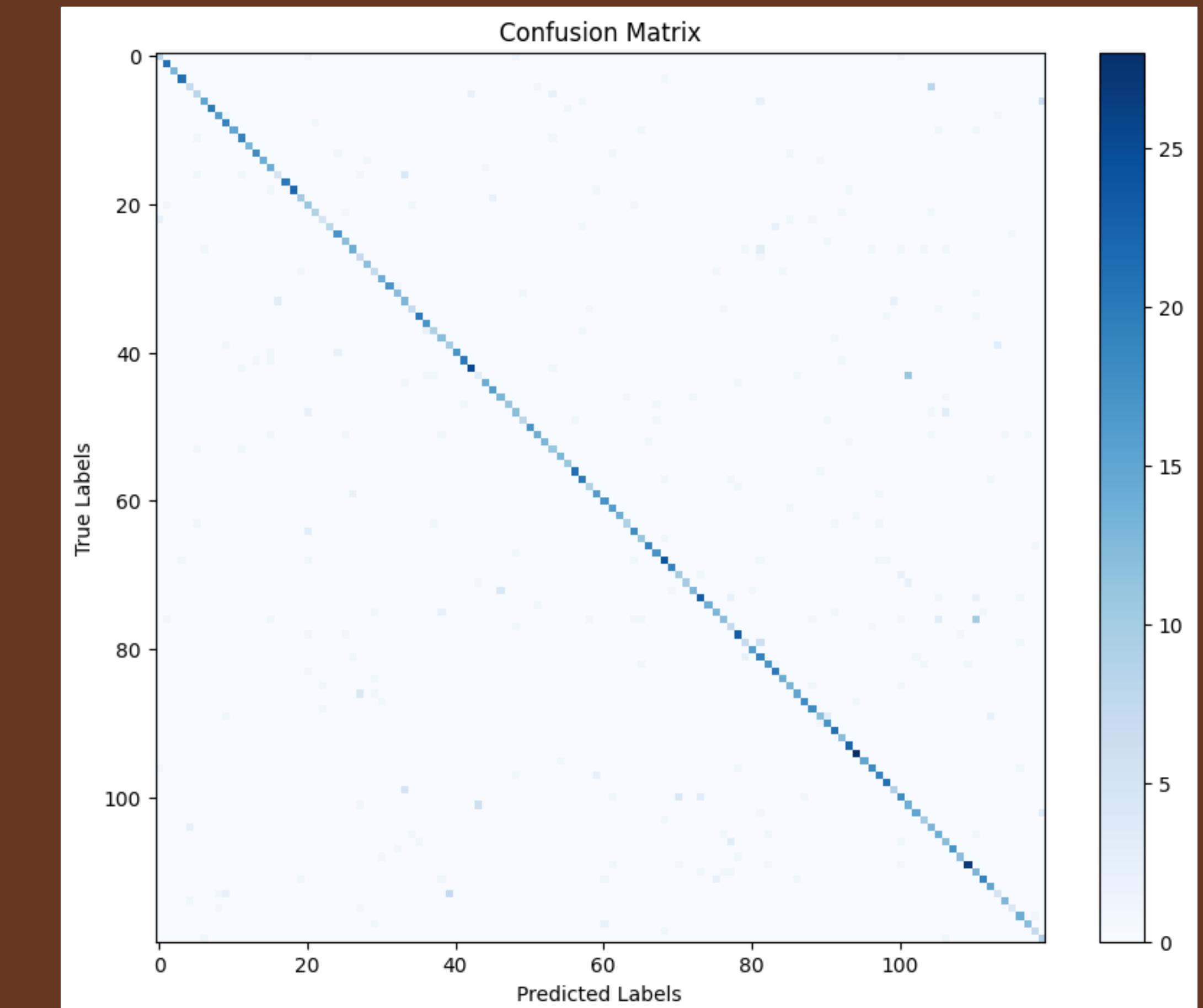


Predicted: irish_terrier
True: australian_terrier



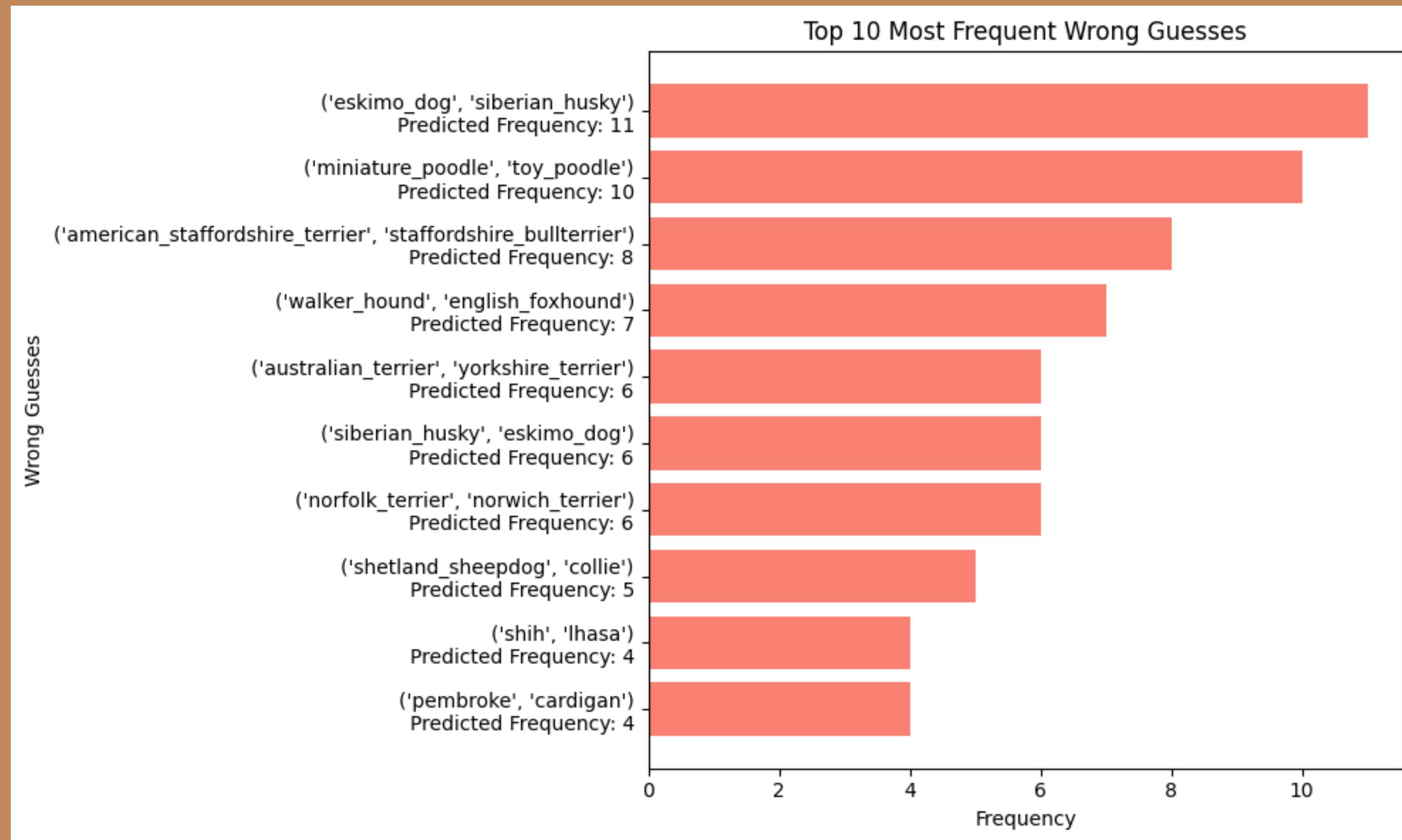
Model Group 1

Confusion Matrix



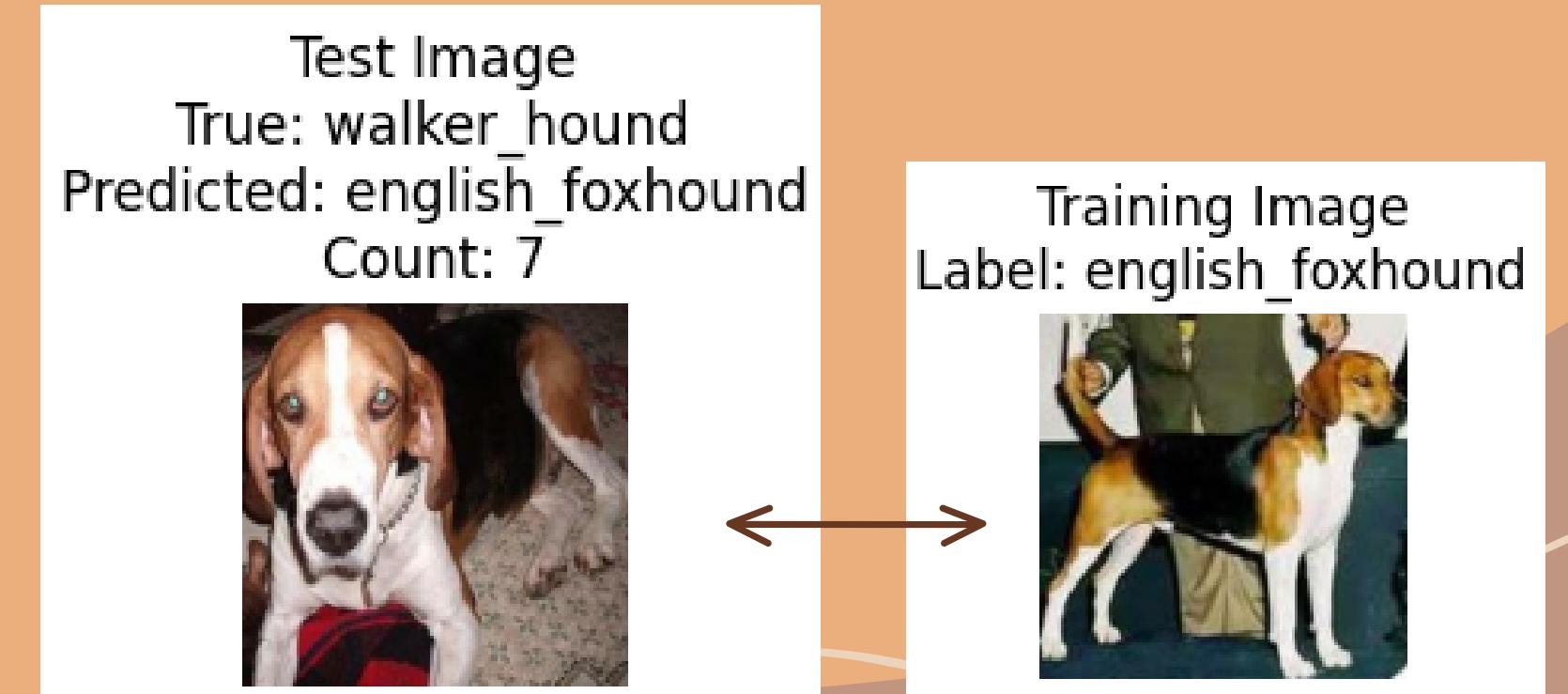
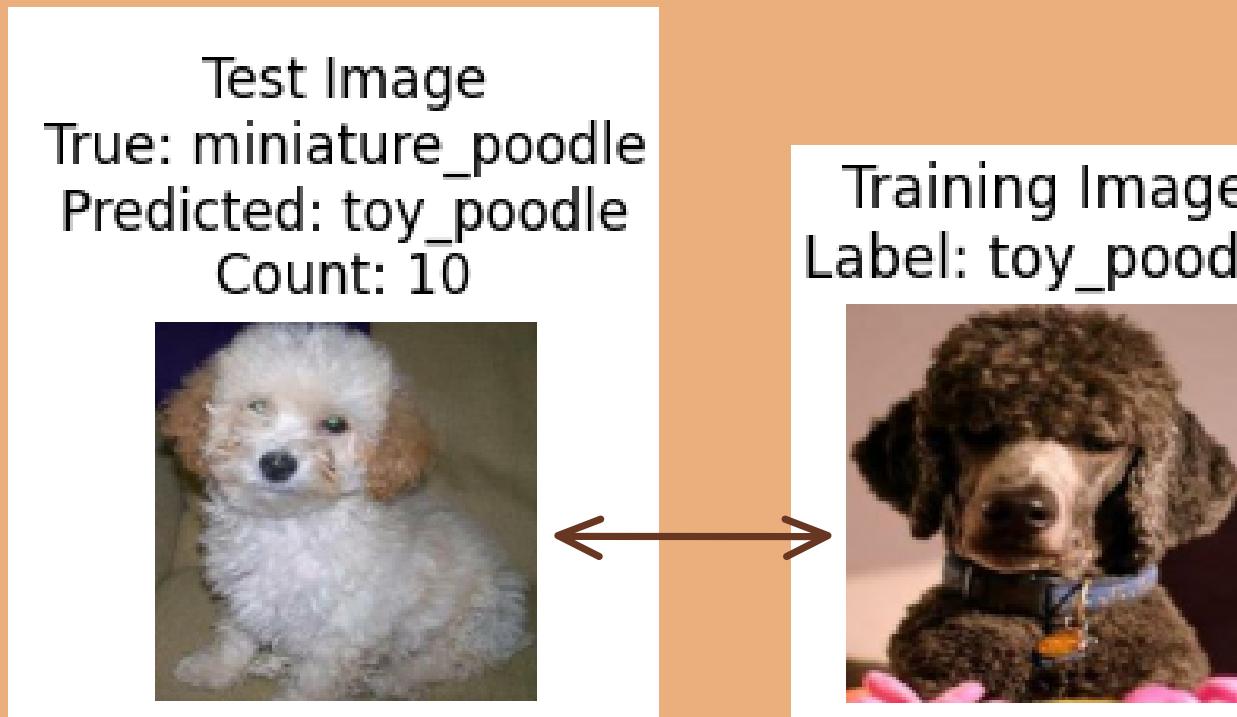
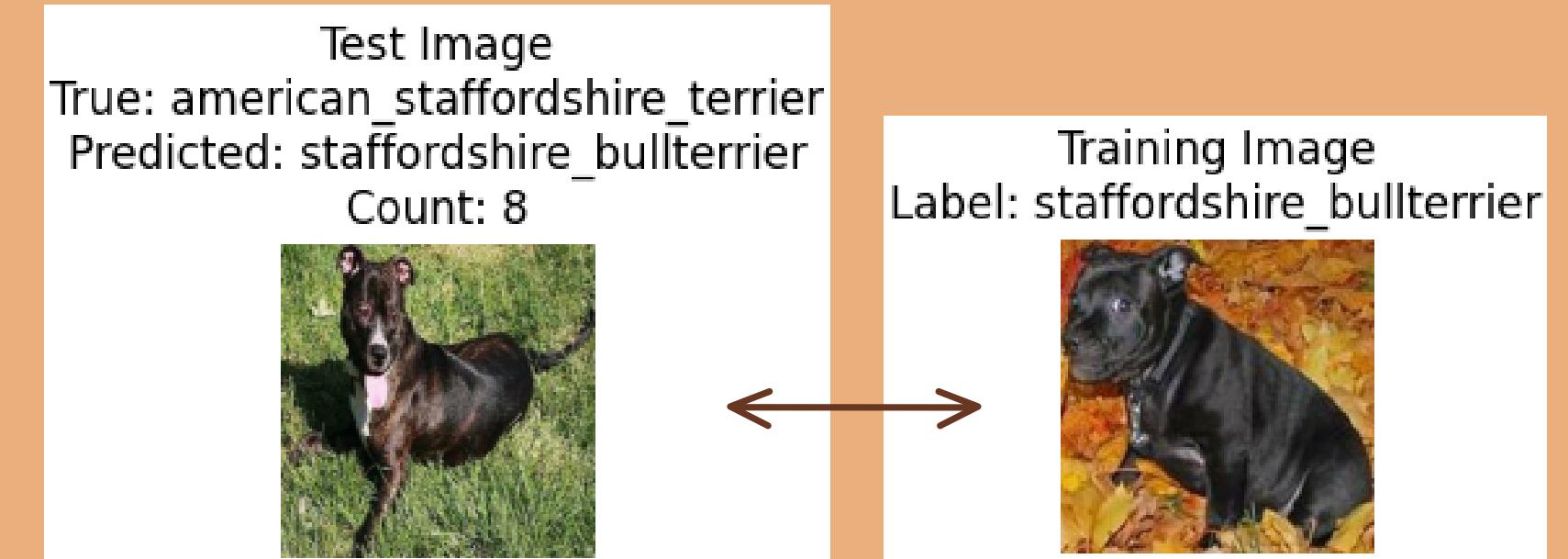
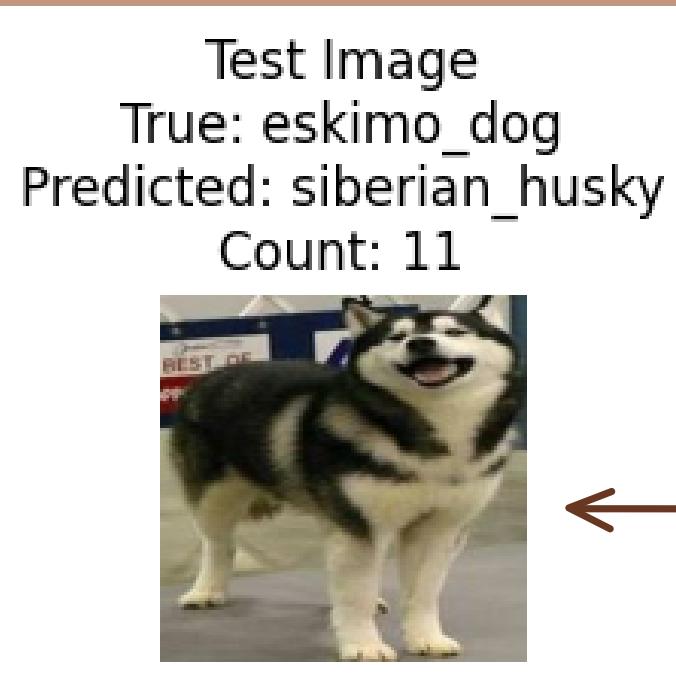
Model Group 1:

Model Presentation and Challenges



Model Group 1:

Model Presentation and Challenges



Summary

- Process review
- Challenges & Success
- Insights
- Follow-up steps

