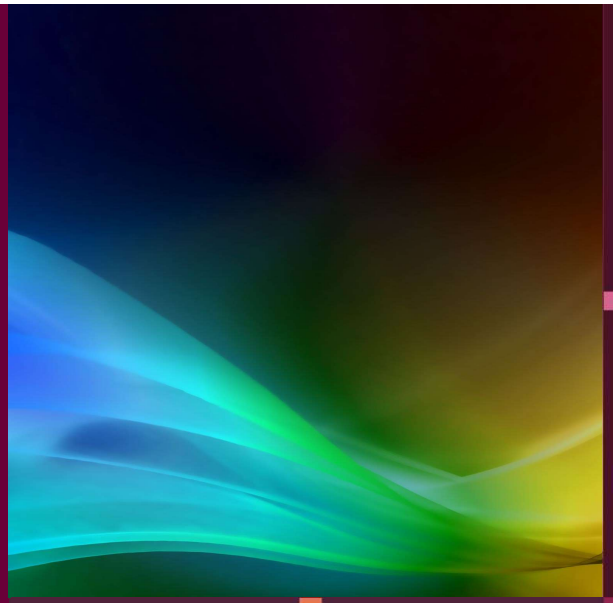
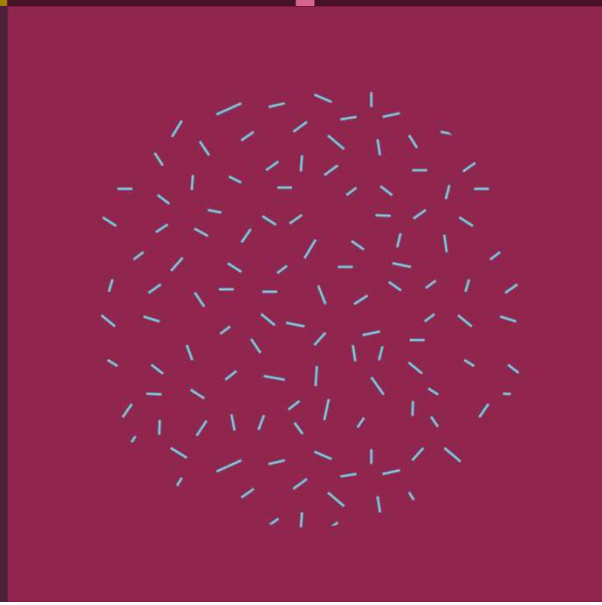
Santa's Workshop

- **Dog Breed Identification**

Dunovan R, Alex H, Lauren B, Chuck S

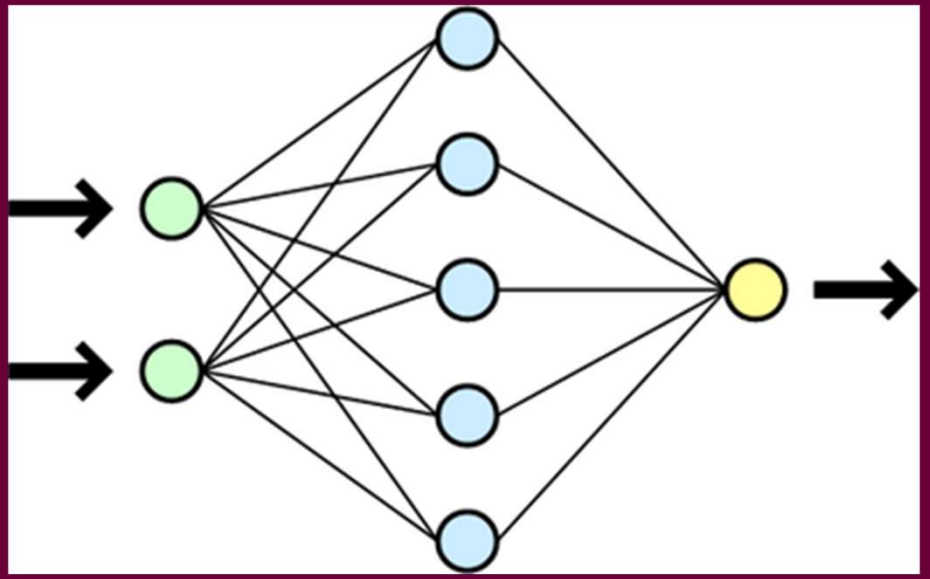




Santas Workshop is Busy!

Business Problem

Use Case



Agenda

Problem & Business Case
Data Preparation & Features
Model Strategy & Results
Impact & Next Steps

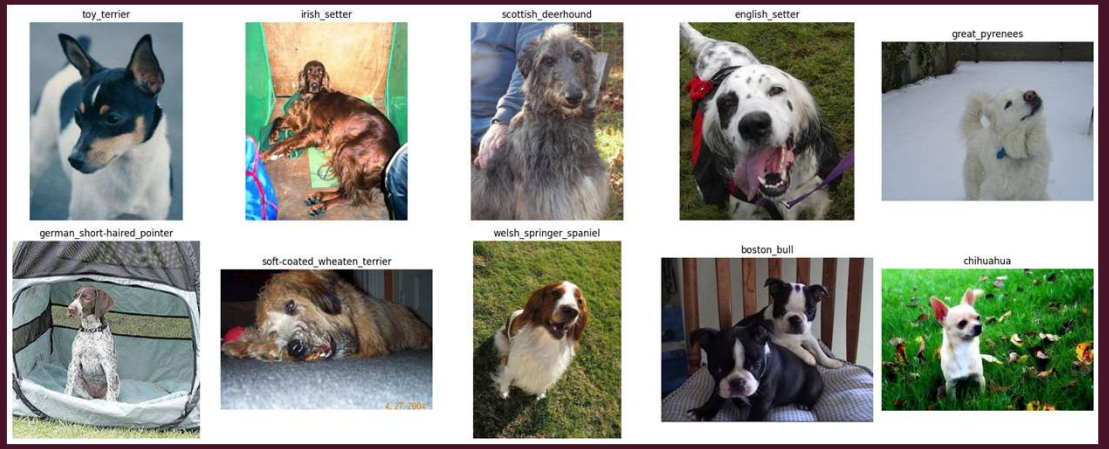
Why it matters

- Operational Efficiency
- Improved Family Satisfaction
- Error Reduction

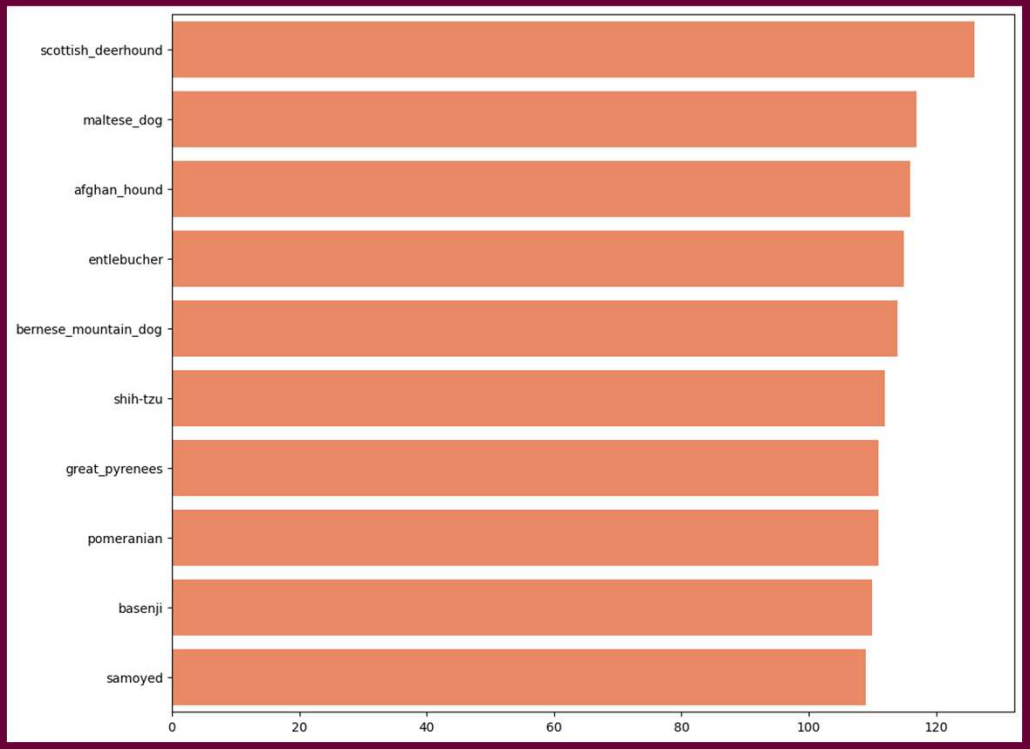
Data Exploration

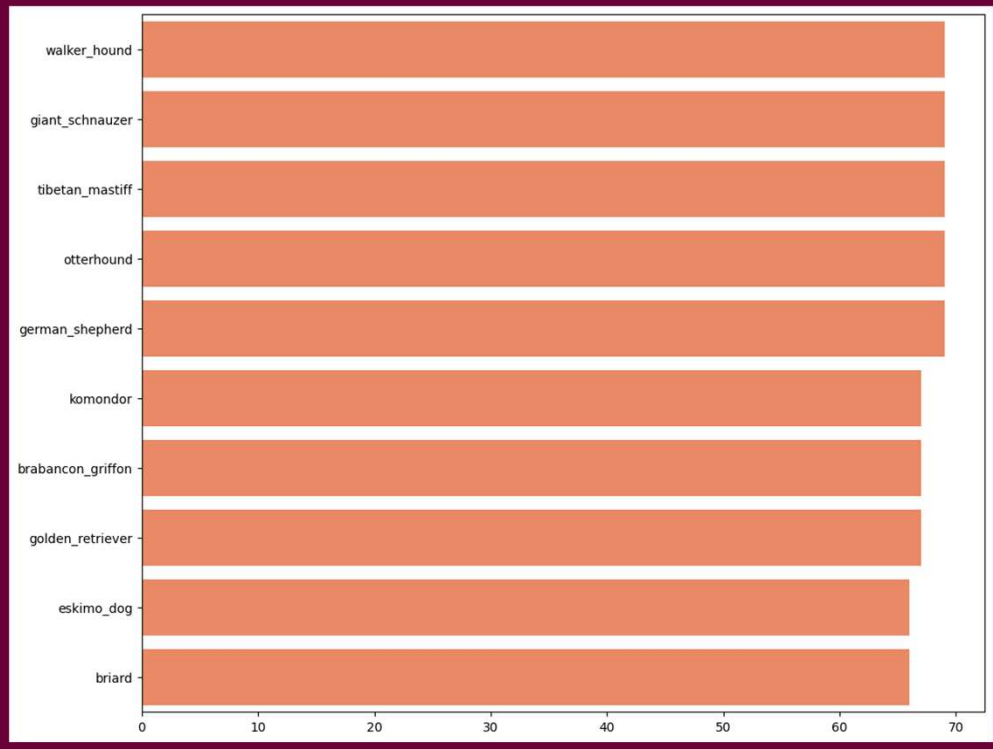
- 120 total dog breeds
- 10222 total images

- 70% train 30% test
  - 15% val / 15% test



Top and Bottom 10 Breed Distributions





Modeling Approaches

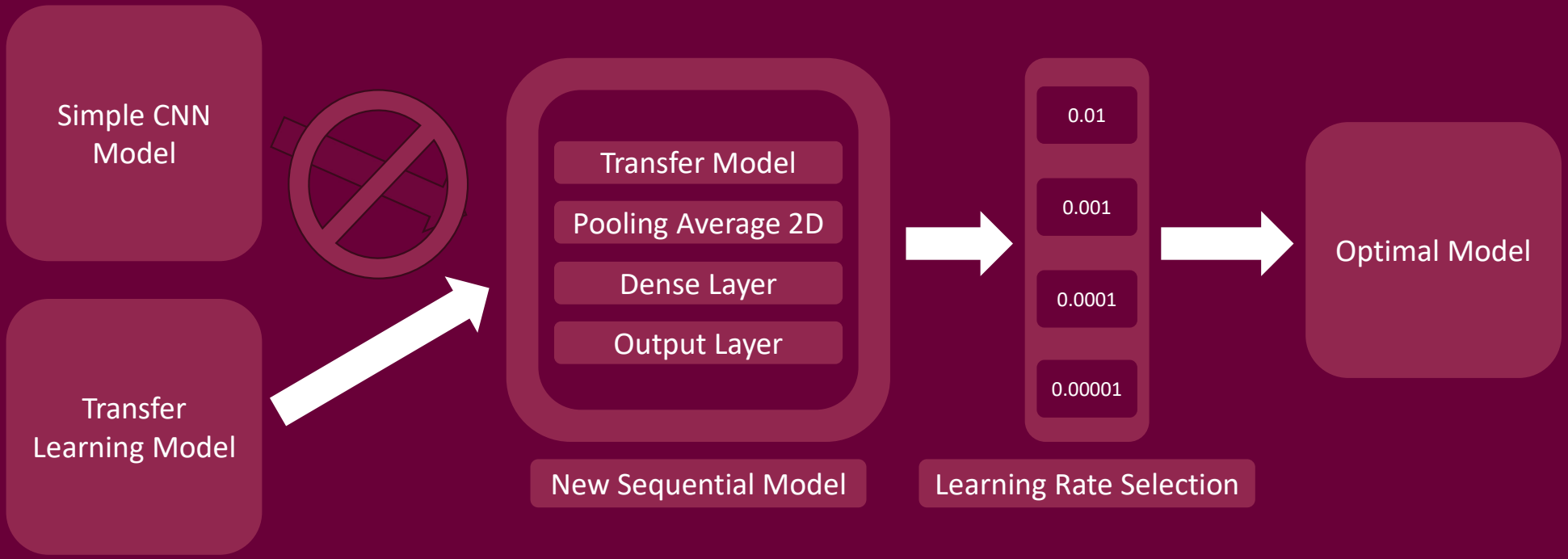
Baseline Model

- Simple Neural Network (CNN)
- TensorFlow
- 3 layers

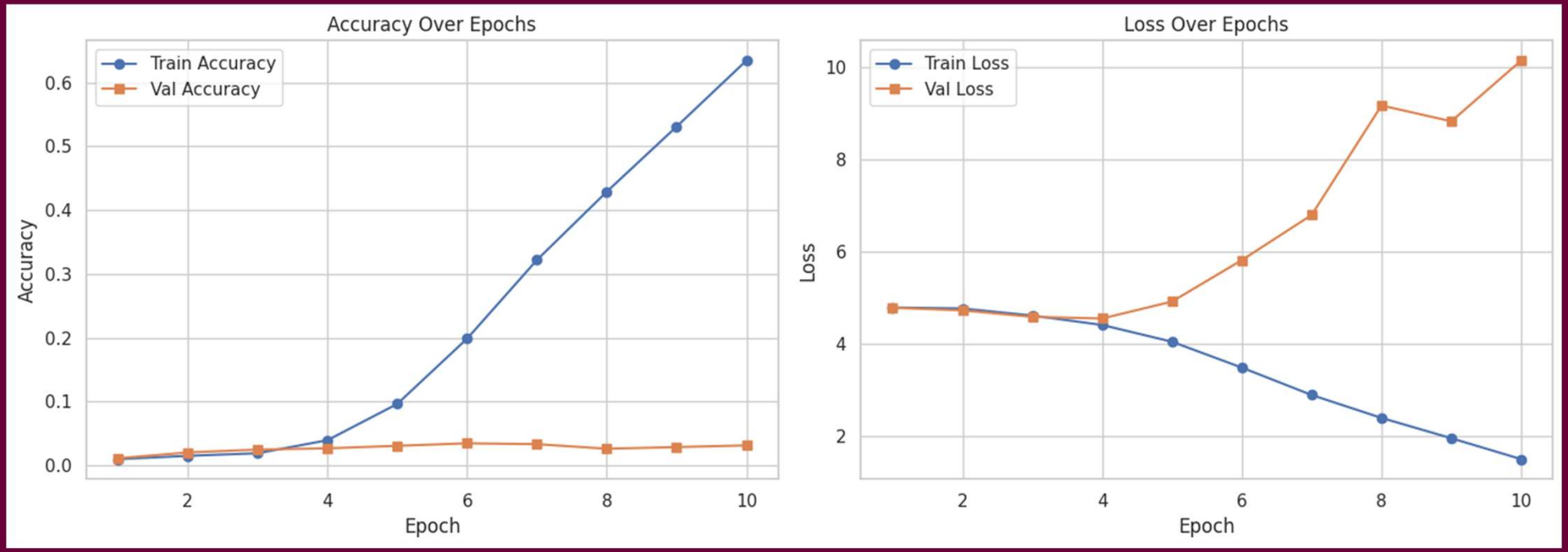
Deep Transfer Learning

- MobileNetV2 base model
- Custom classification layers
- Compiling and training

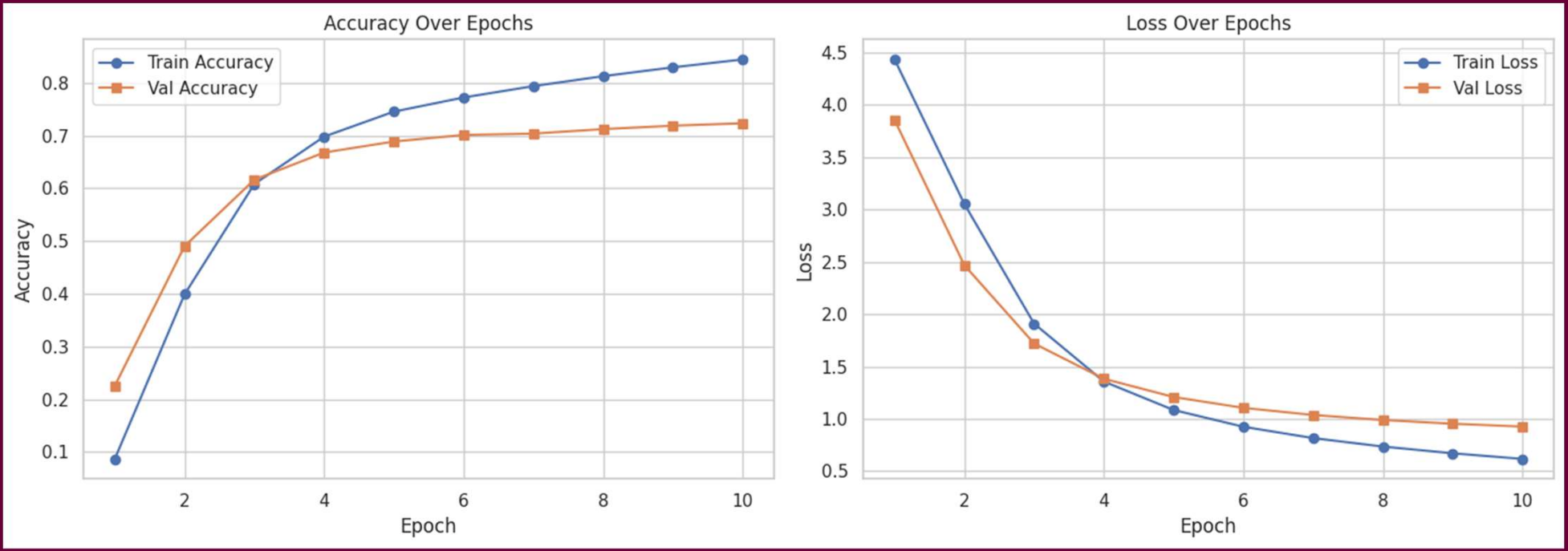
Model Tuning and Optimization



Simple CNN Performance



Transfer Learning Performance



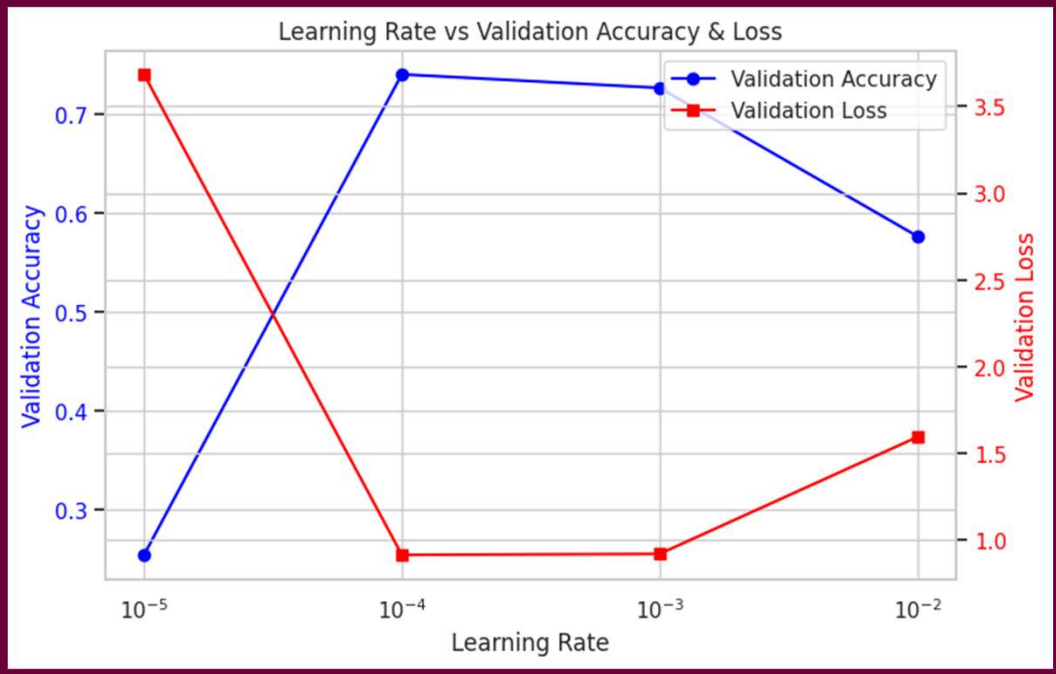
Evaluation Metrics

Simple CNN Model

- Accuracy: 0.03
- Loss: 20.81

Deep Transfer Learning Model

- Accuracy: 0.74
- Model Loss: 0.93
- Weighted Average F1: 0.73



Conclusion and Business Impact

Key Findings:

- Baseline CNN
  - High training performance but very low validation performance
  - Severe overfitting → poor generalization
- MobileNetV2 (Transfer Learning)
  - Strong initial performance
  - Hyperparameter tuning (learning rate = 0.0001) optimized results
  - Final model maintains strong validation performance
- Comparison to Baseline Accuracy
  - MobileNetV2 dramatically outperforms both naive baseline and CNN

Impact:

- This allows Santa's Workshop to match uploaded dog photos to the correct breed instantly, reducing manual elf workload and minimizing routing mistakes.

Next Steps

Build a structured pipeline

Multimodal Integration
- NLP for letter analysis

Establish Global Scale Deployment

Use Case Incubation