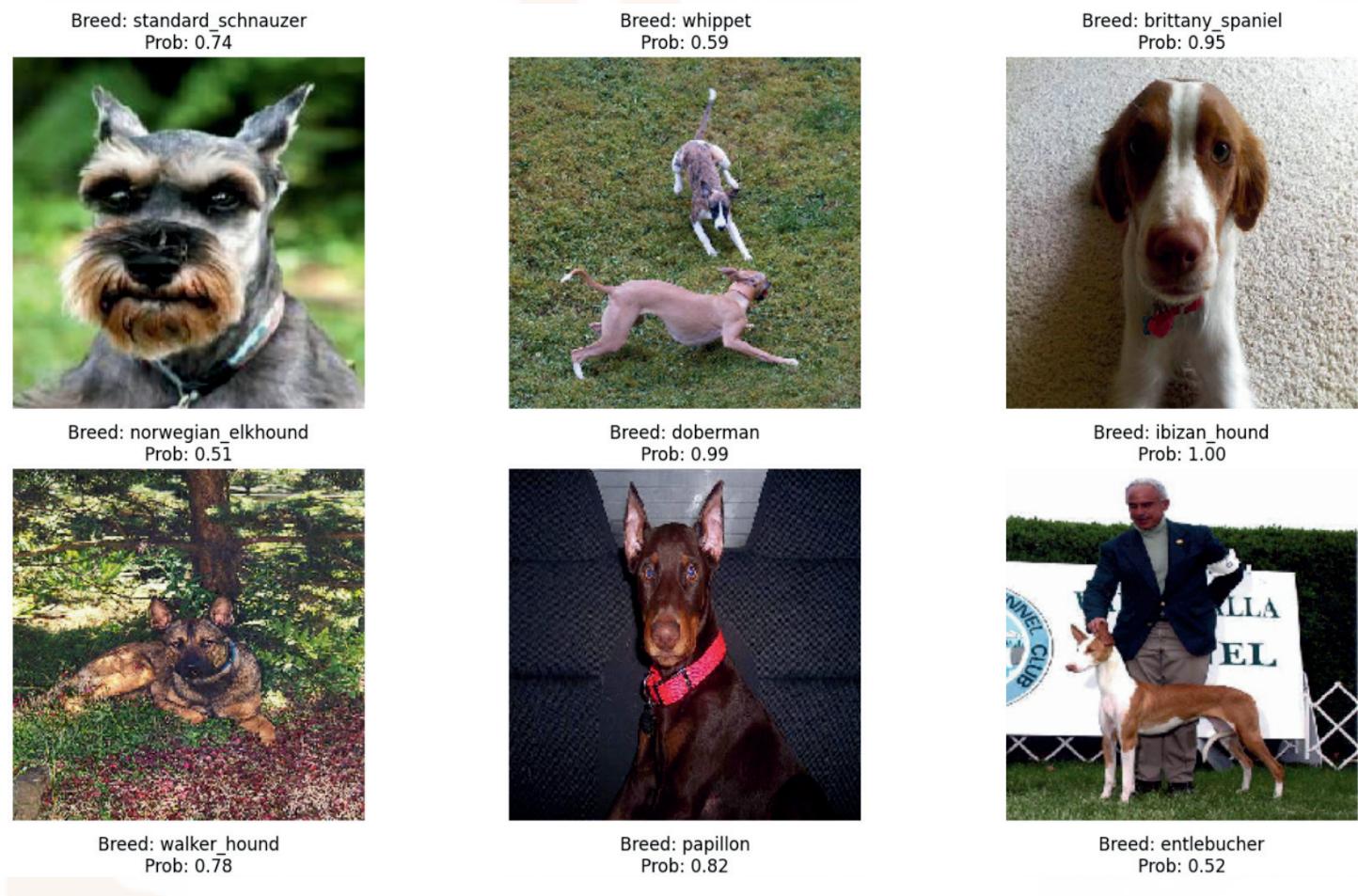


DOG BREED CLASSIFICATION USING DEEP LEARNING MODELS

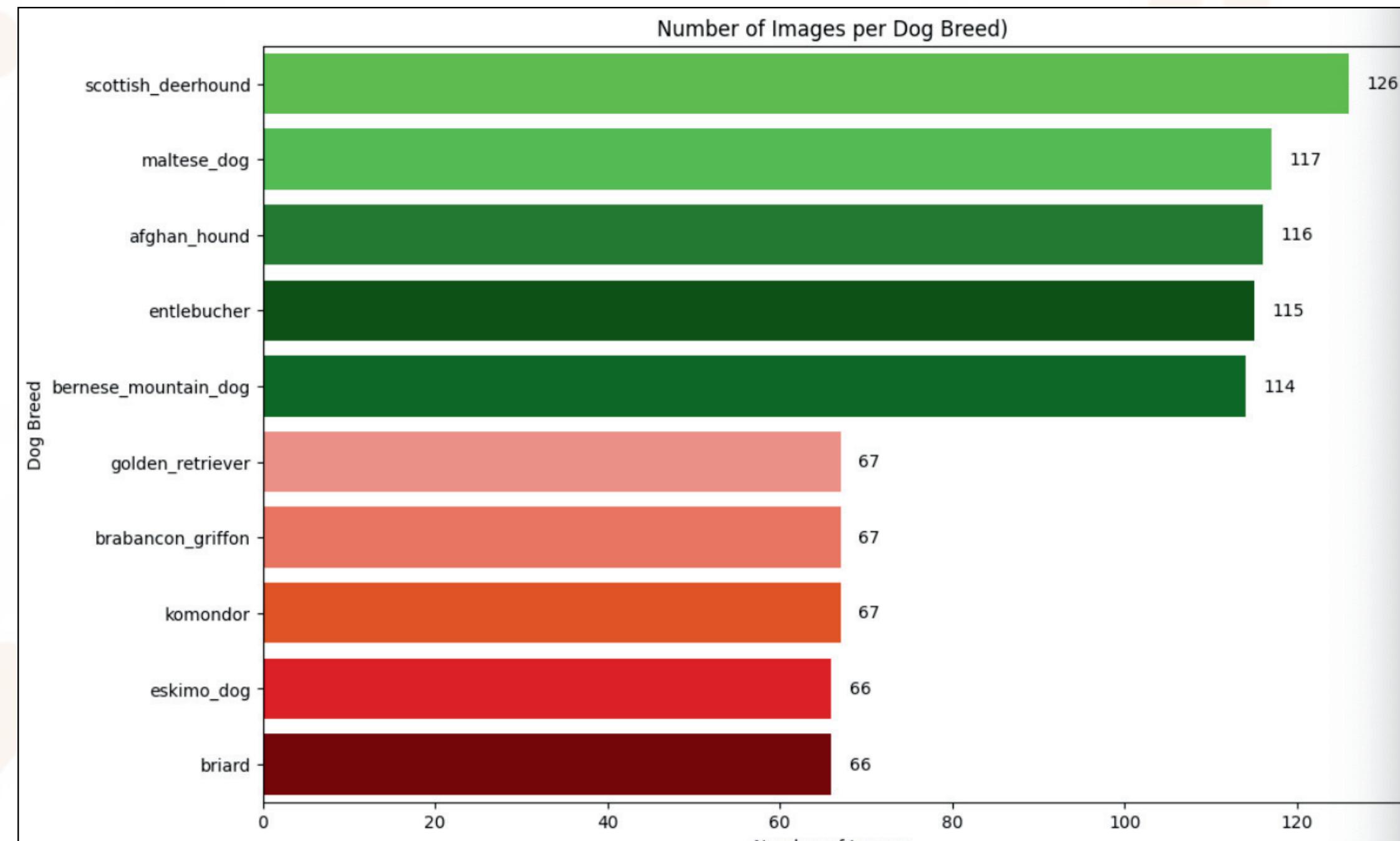
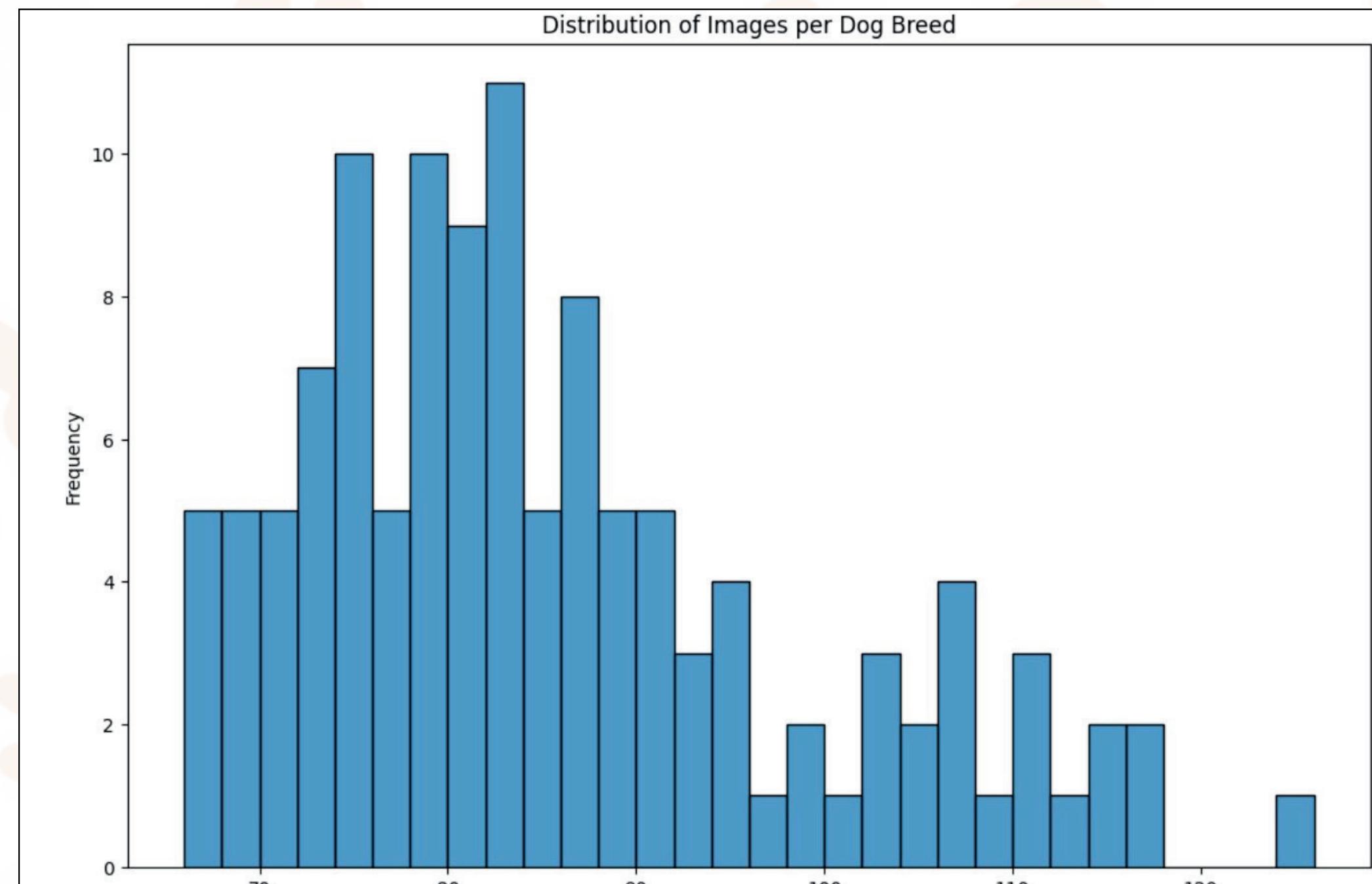
1. PROJECT AIM

IN THIS STUDY, WE AIM TO CLASSIFY IMAGES OF 120 DOG BREEDS USING DEEP LEARNING METHODS WHILE EVALUATING MULTIPLE PRE-TRAINED MODELS FOR OPTIMAL PERFORMANCE.

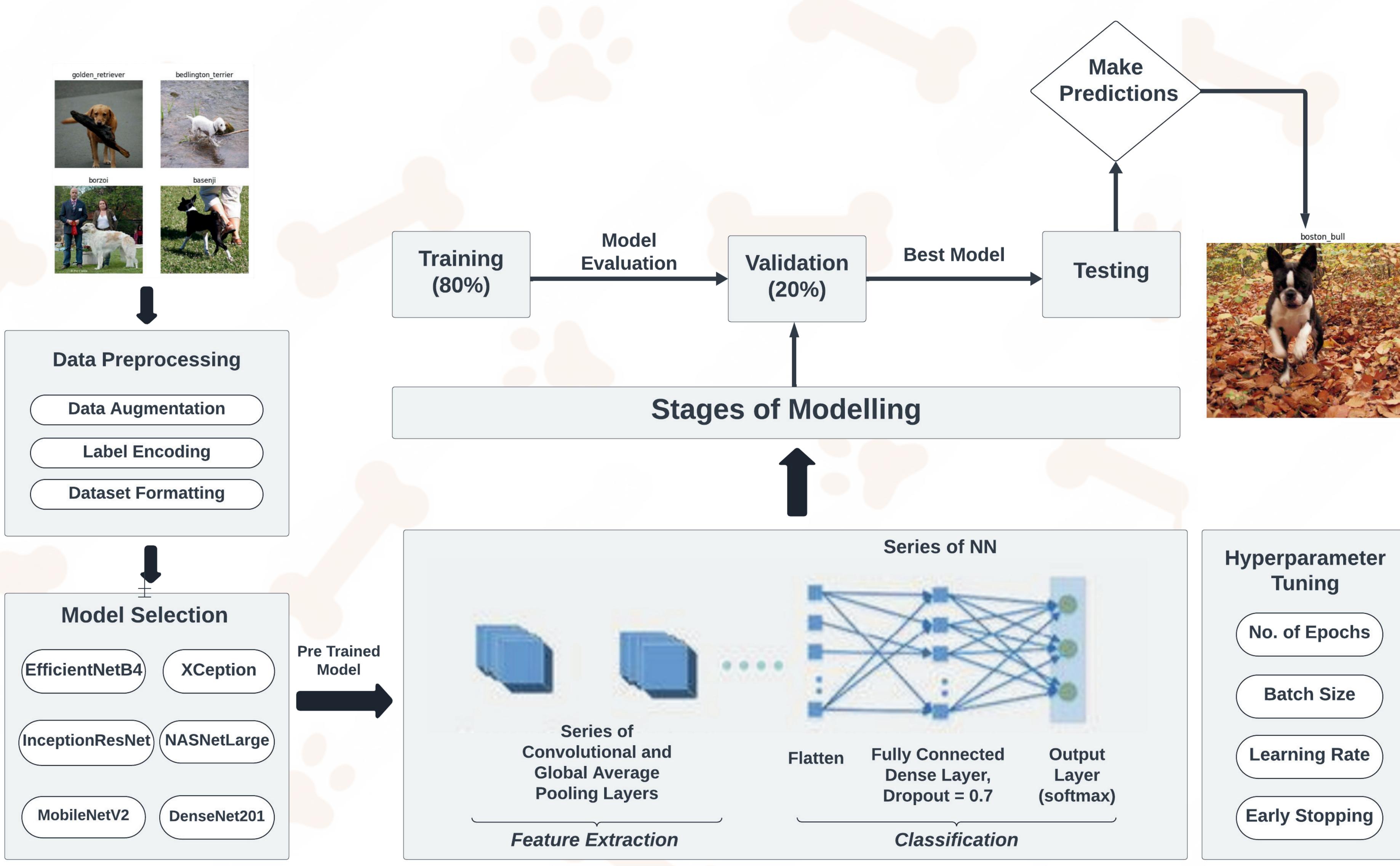
2. DATA COMPOSITION



10,222 IMAGES | 120 UNIQUE DOG BREED
DATA IMBALANCE: FEWER IMAGES



3. OBJECTIVE AND METHODOLOGY



- OBJECTIVE:** TRAIN AND EVALUATE MULTIPLE DEEP LEARNING MODELS

- DATASET:** IMPORT KAGGLE'S DOG BREED IDENTIFICATION DATASET

- PRE-PROCESS IMAGES** - RESIZING, PIXEL VALUES

- DATASET SPLIT:** TRAINING - 80% AND VALIDATION - 20% SETS

- MODELS CONSIDERED :** EFFICIENTNETB4, INCEPTIONRESNETV2, MOBILENETV2, XCEPTION, DENSENET201, NASNETLARGE

- MODEL SELECTION :** SHORTLISTED BASED ON VARIOUS METRICS

- EVALUATION :** PREDICTING UNKNOWN IMAGES FROM TEST DATASET

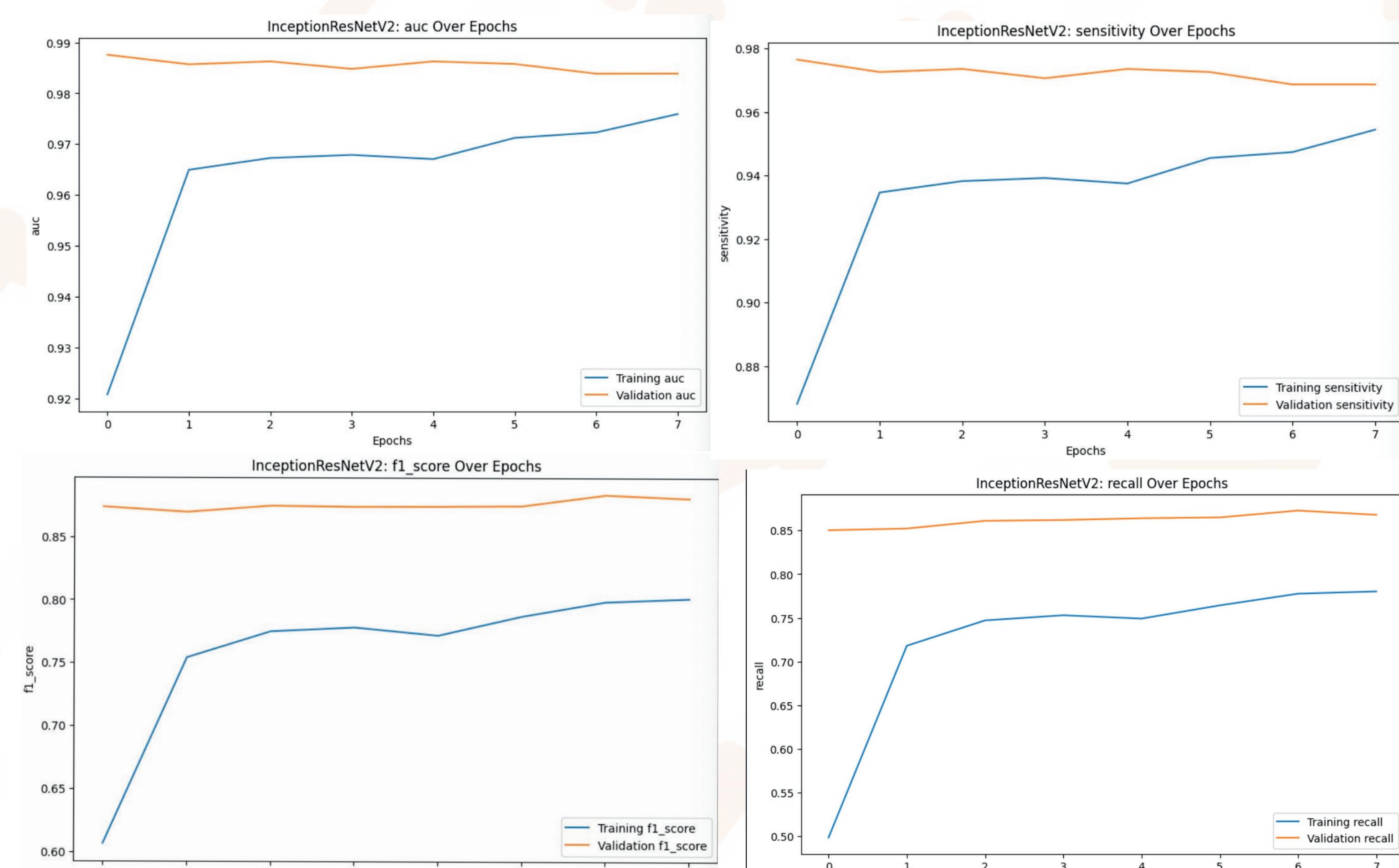
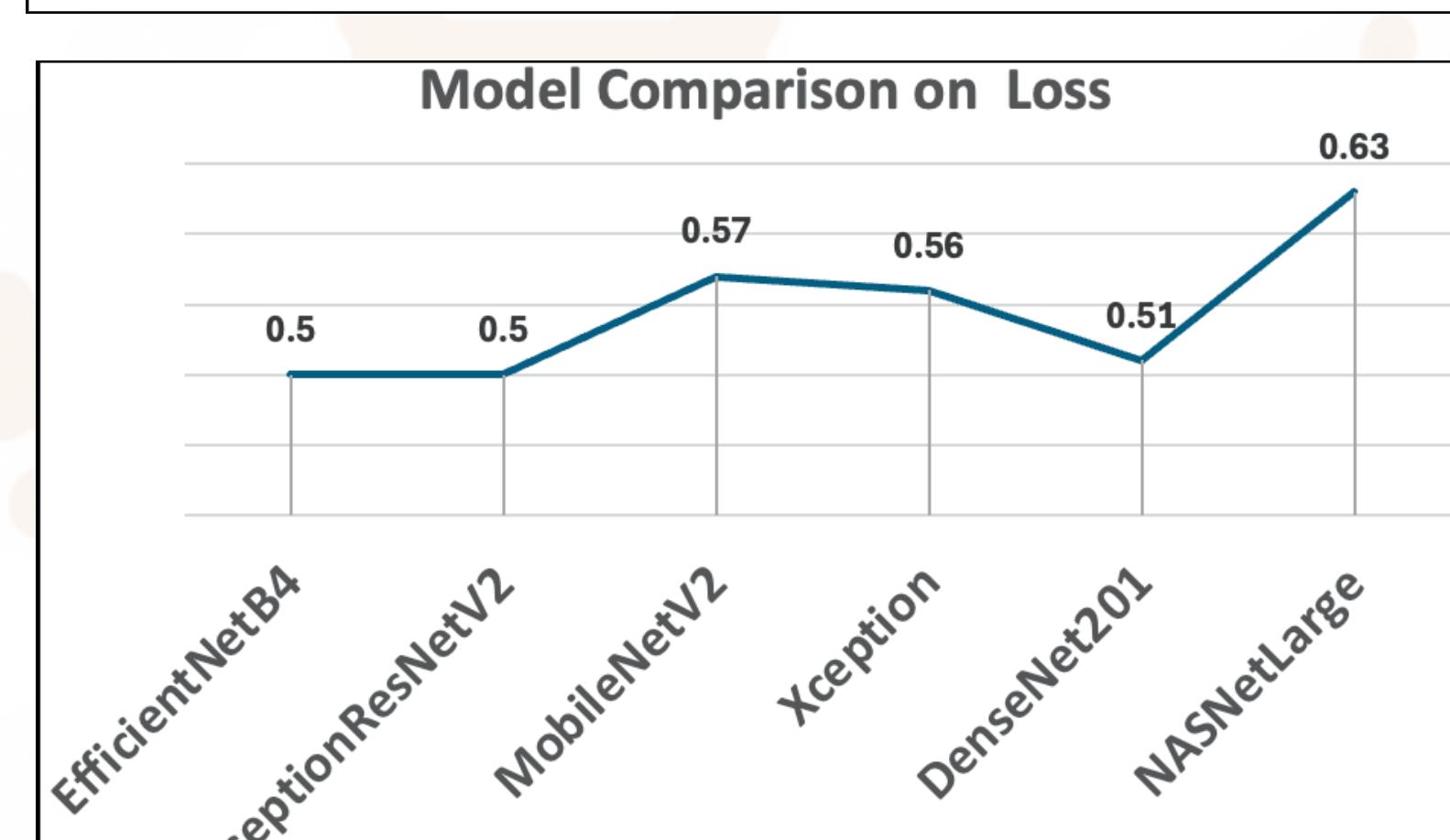
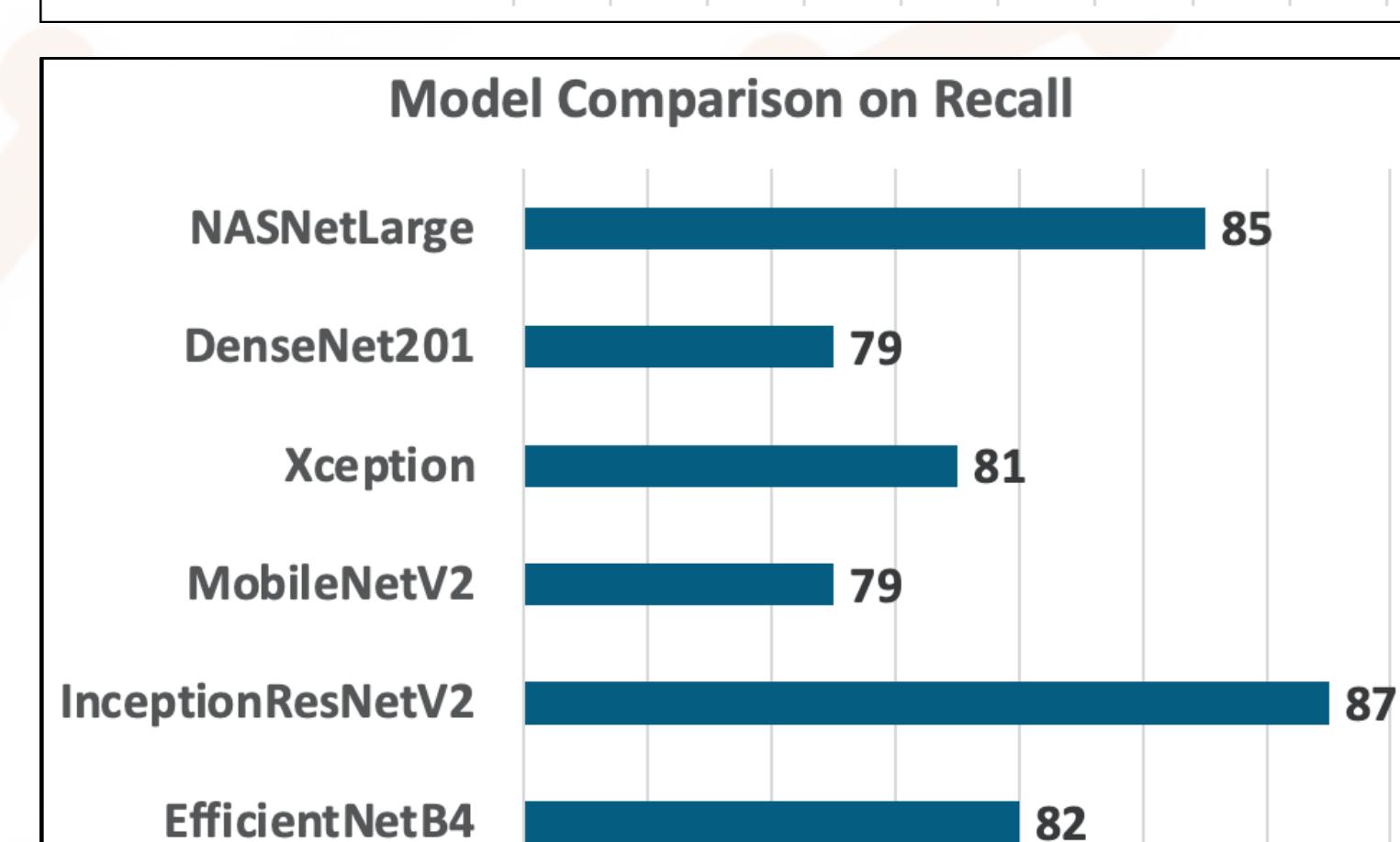
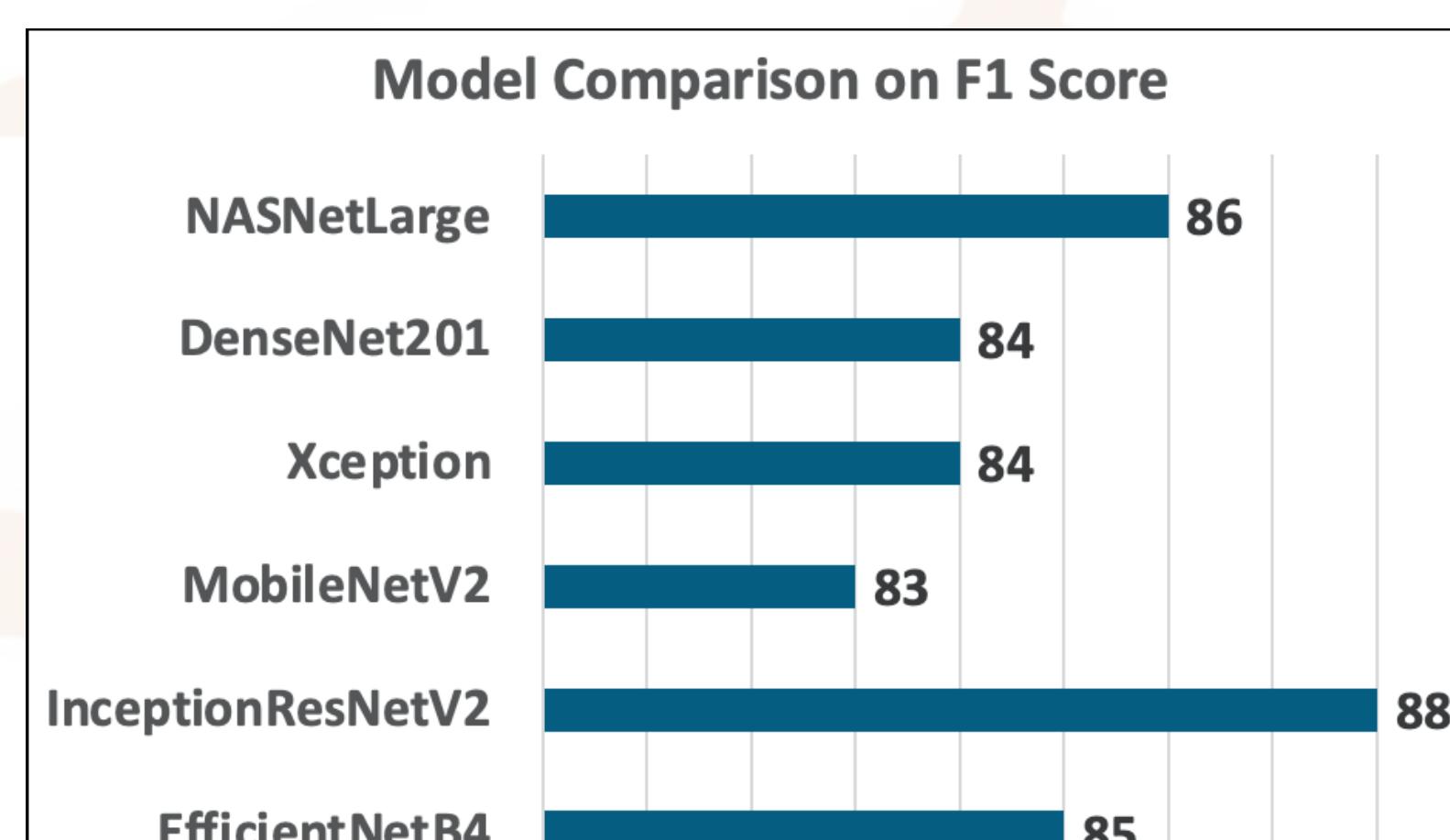
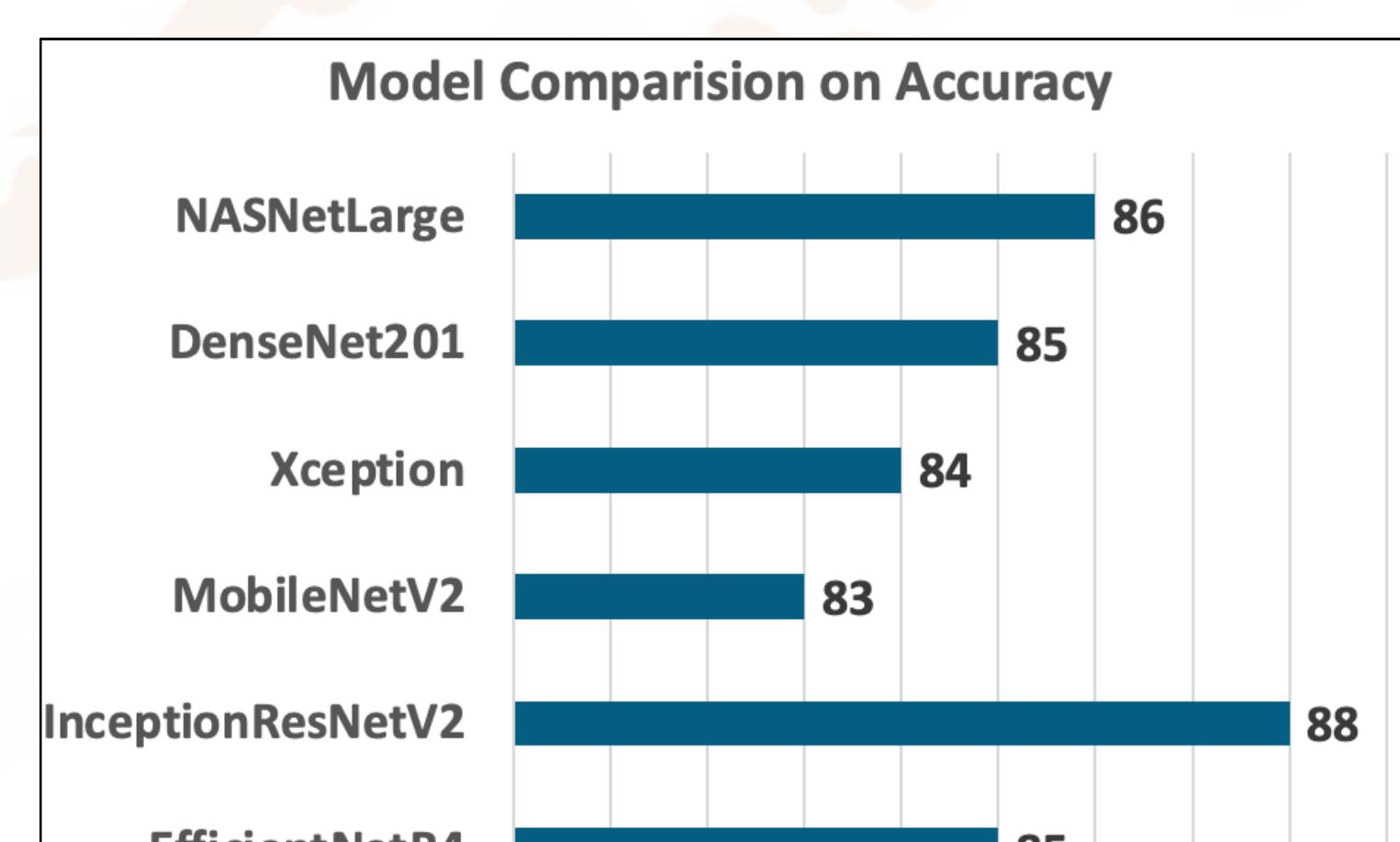
4. MODEL DEVELOPMENT AND EVALUATION

- MODELS:** IMPLEMENT PRE-TRAINED ALGORITHMS ON THE DATASET
- KEY METRICS:** ACCURACY, PRECISION, RECALL, F1-SCORE, LOSS, AUC.
- SELECTED MODEL:** INCEPTIONRESNETV2 (ROBUST AND ACCURATE)

5. BEST MODEL SELECTED

INCEPTIONRESNETV2 MODEL PERFORMANCE:

- | | | | |
|-------------|----------------|-----------------|--------------------|
| ○ LOSS: 0.5 | ○ F1 SCORE: 88 | ○ PRECISION: 89 | ○ SENSITIVITY: 97 |
| ○ AUC: 98 | ○ ACCURACY: 88 | ○ RECALL: 87 | ○ SPECIFICITY: 100 |



6. APPLICATIONS AND FUTURE WORK

APPLICATIONS:

- REAL-TIME IDENTIFICATION
- VETERINARY USE
- SHELTERS & RESCUES
- BREED CHARACTERISTICS AND KNOWLEDGE

FUTURE WORK:

- MODEL DEPLOYMENT
- ENSEMBLING MODELS FOR IMPROVED ACCURACY

CHALLENGES:

- DATA IMBALANCE:** UNEQUAL DISTRIBUTION OF IMAGES ACROSS BREEDS
- UNDERFITTING:** LOW TRAINING ACCURACY WITH HIGHER TESTING ACCURACY

SOLUTIONS:

- BALANCING TECHNIQUES:** APPLY CLASS WEIGHTING AND OVERSAMPLING TO ADDRESS IMBALANCE
- MODEL TUNING:** ENHANCE MODEL COMPLEXITY AND REDUCE REGULARIZATION TO IMPROVE TRAINING ACCURACY

8. CONCLUSION

- INCEPTIONRESNETV2 WAS THE BEST-PERFORMING MODEL WITH ROBUST ACCURACY AND MINIMAL OVERTFITTNG**
- SUCCESSFULLY ADDRESSED DATA IMBALANCE AND UNDERFITTING, PROVIDING A FRAMEWORK FOR SIMILAR TASKS

REFERENCES -

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- SHARMA, S., AND KUMAR, S., 2021. THE XCEPTION MODEL: A POTENTIAL FEATURE EXTRACTOR IN BREAST CANCER HISTOLOGY IMAGES CLASSIFICATION. INFORMATICS IN MEDICINE UNLOCKED, 25.
- NOOR ABDALKAREEM LAFTA AND ABBOOD, A. (2024). COMPREHENSIVE REVIEW AND COMPARATIVE ANALYSIS OF KERAS FOR DEEP LEARNING APPLICATIONS: A SURVEY ON FACE DETECTION USING CONVOLUTIONAL NEURAL NETWORKS. INTERNATIONAL JOURNAL OF RELIGION.

