The Revelation of Dog genres using the YOLO Model

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Abstract- ***Pet dogs are gifted resources for humans due to their emotions and physical characteristics. They have variety among themselves like Beagle, Pomeranian, Pug, American Staffordshire, and Chihuahua. The proposed model represents the Revelation of Dogs genre. Until today date researchers had commonly done object detection so we have focused on dogs' genre revelation which is a challenging task as it contains many different appearances which makes it difficult to spot a difference between the genre of dogs. The revelation of dogs has become very challenging and this revelation is taken on deep learning concepts and also training the dataset which helps to train the model that predicts and gives accuracy at different levels. The proposed model makes use of the makesense.ai application to create boundary boxes and classes. The proposed model has used the Yolo model v5 to train the dataset. This paper documents an ample dataset of dog genres gathered from Kaggle and the training process of the detector. The proposed model has taken a total of five genres of dog images as a dataset. The Yolo model has given good accuracy.***

Indexed Terms- ***Revelation of Dogs genres, Authentication, Supervised Learning Model, Revelation, Detection, Deep Learning.***

I. INTRODUCTION

The proposed paper hopes to do revelation of the Dogs genres. There is a fined-grained revelation problem: all genres share similar body types and overall body structures so differentiating among genres is difficult. Furthermore, there are low inter-breed and high intra-breed variations; in other words, there are relatively fewer differences between genres and relatively huge, differences within genres, differing in size, shape, and color. Dogs are genetically diverse species on earth. The difficulties of identifying genres because of the diversity are compounded by the stylistic differences of images used in the dataset, which features dogs of the same genres in a variety of lighting and positions. The proposed project focuses on the relevance of the Yolo model detector in the revelation of Dogs genres. This challenging dog genre's revelation was chosen for two reasons: First, the inter-variability of the model is enormous. Second, make the proper use of the Yolo model and give an accurate result.

II. METHODS

Training a YOLO (You Only Look Once) model for dog breed detection involves several steps, including data collection, data preparation, model architecture selection, training, and testing. Here's a step-by-step guide on how to train and test a YOLO model for dog breed detection:

1. Data Collection: - Collect a dataset of dog images with annotated bounding boxes specifying the location of the dog in each image. - Ensure that the dataset includes a variety of dog breeds and a sufficient number of images for each breed.
2. Data Annotation: - Annotate the images in your dataset with bounding boxes around the dogs. This can be done using annotation tools like LabelImg, VGG Image Annotator, or custom scripts. - Each annotation should include the class label (dog breed) along with the bounding box coordinates (x, y, width, height).
3. Data Splitting: - Split your dataset into training, validation, and testing sets. A common split is 70% for training, 15% for validation, and 15% for testing.
4. Data Augmentation (Optional but recommended): - Apply data augmentation techniques to increase

the diversity of your training data. This can include random rotations, flips, scaling, and colour adjustments.

5. YOLO Model Selection: - Choose a YOLO model variant suitable for your hardware and dataset size. Common variants include YOLOv3 and YOLOv4. - You can either train a model from scratch or fine-tune a pre-trained model on your dog breed dataset. Fine-tuning is often faster and more effective.
6. Model Configuration: - Configure the YOLO model architecture and hyperparameters. Important settings include the number of anchor boxes, the input image size, and the number of classes (dog breeds).
7. Training: - Train your YOLO model using the training dataset. Use a loss function like the YOLO loss, which penalizes localization and classification errors. - Monitor training progress using metrics such as loss and map (mean Average Precision) on the validation dataset. - You may need to experiment with different learning rates, batch sizes, and other hyperparameters to achieve good performance.
8. Testing: - After training, evaluate your YOLO model on the testing dataset to assess its performance. Calculate metrics like precision, recall, F1-score, and map to measure how well the model detects dog breeds.
9. Post-processing: - Apply non-maximum suppression (NMS) to remove duplicate and low-confidence bounding boxes. - Visualize the model's predictions on test images to verify its accuracy.
10. Fine-tuning (Optional): - If your model's performance is not satisfactory, you can fine-tune it with additional epochs or adjust hyperparameters.
11. Inference: - Once your YOLO model is trained and tested satisfactorily, you can use it for inference on new dog images to detect and classify dog breeds.
12. Deployment: - If needed, deploy your trained YOLO model in a production environment for real-time or batch processing.

Remember that training a YOLO model can be computationally intensive and may require access to GPU resources. Additionally, ensure that you have a large and diverse enough dataset for accurate dog breed detection.

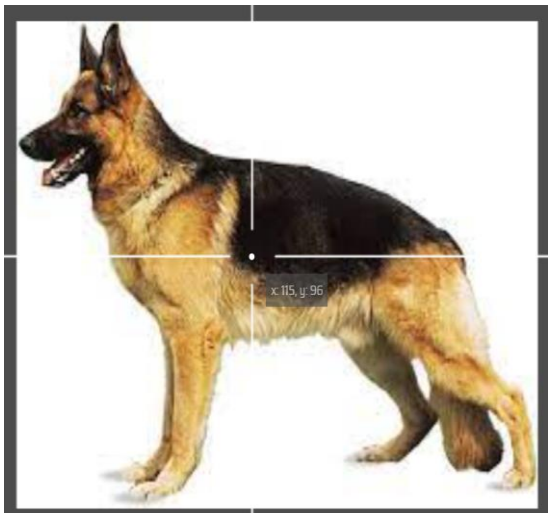

Fig. 1. Labialization of dog breed.

III. LITERATURE REVIEW

The research paper of Bickey Kumar shah; Aman Kumar; Amrit Kumar dealt with the breed classification of dogs. In their research paper, they converted images to a single label of dimension with image processing. This research work has used principal component analysis to shorten the most similar features into one group to make an easy study of the features in deep neural networks. The images under test are classified as a breed with the minimum weight between test and train images [1]. The researchers Heidi G. Parker1 Dayna L. Dreger1 and others have done the genomic data examination from the diverse and largest groups of breeds. They have 1,346 datasets of dog that represents 161 breeds of dog. They proposed that breeds that form unique clad supported by 100% of bootstrap are combined into triangles. They came to know that eleven breeds did not group with significance to any other group [2] The researchers J.E Hayes S.L Forbes and others have done dog detection and the connections of physiology, training, and analytical methodologies. In their work, these scientific methodologies that they have used provide both an alternative and assistor for the detection dog industry, however, the interrelationship between these two detection paradigms requires clarification. This review offers an integrated assessment of the factors involved in order to determine the current and future status of detection dogs.[3]. The researchers Greg S Baxter, and others have collated the scientific literature to present

important behavioural and physical traits. Although wildlife detection dogs are this paper's focus, these proposed traits are relevant in any detection field.[4].

IV. YOLO Model

A feed-forward neural network called a Convolutional Neural Network analyses visual pictures by processing data in a grid-like architecture. It is sometimes referred to as a ConvNet. To find and categorise items in a picture, a convolutional neural network is employed. The process of removing useful elements from an image begins with this. Multiple filters work together to execute the convolution action in a convolution layer. Each image may be thought of as a matrix of pixel values. A filter matrix with a 3x3 dimension is also included. To obtain the convolved feature matrix, move the filter matrix across the picture and compute the dot product. The rectified linear unit is referred to as ReLU. The next step is to transfer the feature maps to a ReLU layer after they have been retrieved. ReLU does an operation element-by-element, setting all the negative pixels to 0. The result is a corrected feature map, and it gives the network nonlinearity. The down sampling process of pooling lowers the feature map's dimensionality. To create a pooled feature map, the corrected feature map is now passed through a layer of pooling. predict the classes with greater accuracy. At this step, the error is calculated and then backpropagated. The weights and feature detectors are adjusted to help optimize the performance of the model. Then the process happens again and again and again, in this way the network trains on the data. To distinguish distinct portions of the picture, such as edges, corners, bodies.

Fig. 2. Illustration of the proposed YOLO (You Only Looks Once)

V. METHODOLOGY

YOLO Model: YOLO algorithm gives much better performance on all the parameters along with a high fps for real-time usage. YOLO algorithm is an algorithm based on regression, instead of selecting the interesting part of an Image, it predicts classes and bounding boxes for the whole image in one run of the Algorithm. In order to train our data, set the task that we are going to perform are as follows: 1. Image Pre-processing: The purpose of this step is to improve the quality of image data by compressing unwanted contortion and intensifying some important image characteristics so that our computer model can get all the benefits from this improved dataset. 2. Detection of an object: In this process, we will be doing segmentation of the image and recognizing the position of the object. 3. Characteristics extraction and Training: This process is a critical process where deep learning methods are used to classify the interesting pattern of the image, characteristics that might be unique to a class. In this process, the model learns the characteristics from the dataset is called model training. 4. Categorization of the object: This step classifies the detected object into the classes that are already defined by using a suitable categorization technique that compares the image with the target pattern. In the proposed research paper, the dataset is used to classify dog genres that are gathered from different sources. The data is segregated into 70% for training purposes, 20% for validation purposes, and 10% for testing purposes resulting in 350 pictures for the training set and 100 pictures for the validation set. The dataset is trained in google collaborator using python language. The datasets are defined by importing torch and utils in google collaborator. As the concluding consolidated. Dataset was more thanenough no additional scheme was applied. The anticipated bounding boxes were made in such a way that they match the size of anchors until 3 epochs of training. The training was done in batch size 16. After training our datasets the YOLO model gave a good accuracy that is 100% till the 60 epochs. At the time of training the dataset, the input size of the image was set to 250 x 250 pixels.

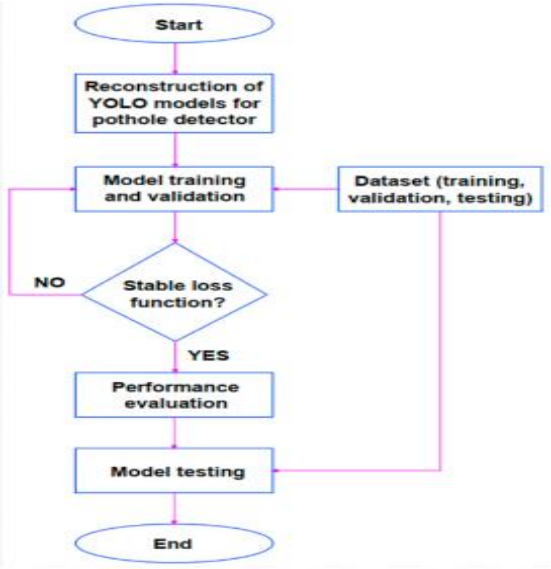

Fig. 3 Illustration of the proposed model

VI. RESULTS

In this research paper, the training model consists of 350 raining images and 100 validation images. The dataset was gathered from Kaggle. We have taken a total 5 genres of dogs each consisting of 100. The YOLO Model generates very good results after training it with 350 images. We trained our data set to 60 epochs and it gave 100% results. Adam optimizer offers the greatest accuracy performance and loss performance.

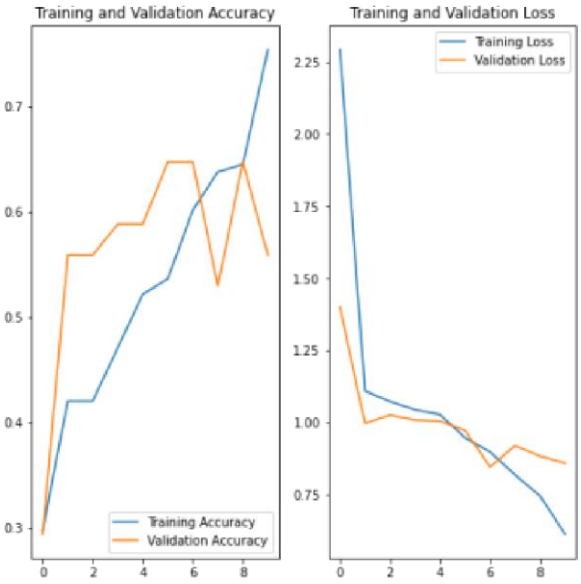

Fig. 4. Graph illustrating accuracy and validation loss

The accuracy and loss graph shows a lot of spikes, which suggests as much. While the accuracy of the system model that applies Adam optimization. Training and validation data are less, and the system false also starts to decline at each iteration. The proposed YOLO model can classify different ant species with good performance and gives low error.

TABLE I. RESULTS DEPICTING ACCURACY GAINED BY YOLO

Epochs	Accuracy	Validation Accuracy
Epoch 1/10	0.5874	0.6
Epoch 2/10	0.4856	0.559
Epoch 3/10	0.7591	0.525
Epoch 4/10	0.4856	0.547
Epoch 5/10	0.7452	0.660
Epoch 6/10	0.4785	0.679
Epoch 7/10	0.8546	0.4750
Epoch 8/10	0.4856	0.7854
Epoch 9/10	0.8541	0.8657
Epoch 10/10	0.8645	0.7506
Epoch 11/10	0.8650	0.8745
Epoch 12/10	0.8784	0.7557
Epoch 13/10	0.8900	0.7451
Epoch 14/10	0.9584	0.8821
Epoch 15/10	0.9580	0.8821

CONCLUSION

This work generated an automated detection system for dog genres. The revelation(detection) is done among five genres of dogs. The Yolo model trained our dataset in 4 steps first object detection, second creating boundary boxes, third object segmentation, and lastly data augmentation. The images were 250 X 250 pixels. After testing results shows that the Yolo model v5 worked in the detection of the dataset of dog genres results with 100% accuracy. This proposed method shows that the suggested model is promising to use as at today's time there are many breeds of dog which look similar so it becomes difficult to make difference between them due to which many people get confused so to avoid this confusion it is good to use this mode. They can use this model in pet shops

also so that they can't get fooled by the pet shop owner.

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