

Ideation Phase

Literature Survey

Date	27 September 2022
Team ID	PNT2022TMID30160
Project Name	Digital Naturalist - AI Enabled tool for Biodiversity Researchers
Maximum Marks	4 Marks

PAPER-1

Ungulate Detection and Species Classification from Camera Trap Images Using RetinaNet and Faster R-CNN (2022)

Authors: Gholamreza Anbarjafari, Ilja Pavlovs, Kadir Aktas ,Egils Avots, Jevgenijs Filipovs, Agris Brauns, Gundega Done, Dainis Jakovels, Gholamreza Anbarjafari

This paper presents a new dataset of wild ungulates which was collected in Latvia. It demonstrate two methods, which use RetinaNet and Faster R-CNN as backbones respectively, to detect the animals in the images. Faster R-CNN–ResNet50 network and RetinaNet were trained for 34,850 iterations (10 epochs) on the training dataset with a batch size of 4, learning rate of 0.0001 and Adam optimizer for the weight update. The general structure of the detector involves image embedding, object localization and classification. DNN consisting of convolutional layers which are used for the feature extraction from the input image. Usually, backbone networks which are pre-trained on a natural image dataset such as ImageNet are used. Common networks used as the backbone are ResNet50, VGG160, Inception-ResNetV2 and DarkNet-19. The neck network takes and processes inputs from the different layers of the backbone, harnessing advantages of data pattern distribution over different feature map scalesby using FPN (Feature Pyramid Network). A feed-forward neural network which performs the classification or regression task.

PAPER-2

Convolutional Network based Animal Recognition using YOLO and Darknet (2021)

Authors: B.Karthikeya Reddy, Shahana Bano, g.Greeshmanth Reddy,Rakesh Kommineni, p.Yaswanth Reddy

This research work has developed a YOLOV3 model to identify the animal present in the image given by user. The algorithm used in YOLOV3 model is darknet, which has a pretrained dataset. Machine learning has been applied to image processing. The image of animal will be given as input, then it will display the name of the animal as output by using YOLOV3 model. The detection is done by using a pre-trained coco dataset from darknet. The image is broken into various lengths and widths based on the given input image. Here for the recognition of image, YOLOV3 model is using recognizer deep learning package. The overall performance of the model is based on the different training images and testing images of the dataset. The detection is done by using a pre-trained coco dataset from darknet.

PAPER-3

Recognition of Endemic Bird Species Using Deep Learning Models (2021).

Author: Yo-Ping Huang, Haobijam Basanta

The objective of the paper is identifying the bird species from images. This study developed a transfer learning-based method using Inception-ResNet-v2 to detect and classify bird species. To validate the reliability of the model, it adopted a technique that involves swapping misclassified data between training and validation datasets. The swapped data are retrained until the most suitable result is obtained. Additionally, fivefold cross-validation was performed to verify the predictive performance of the model. The proposed model was tested using 760 images of birds belonging to 29 species that are endemic to Taiwan. The model has achieved an accuracy of 98.39% in the classification of 29 endemic bird species. The model achieved a precision, recall, and F1-score of 98.49%, 97.50%, and 97.90%, respectively, in classifying bird species endemic to Taiwan.

PAPER-4

The Analysis of Plants Image Recognition Based on Deep Learning and Artificial neural network (2020).

Authors: Jiang Huixian

This paper aims to identify and classify the plant using the leaves of the plant. The approach is to extract plant leaf features and identify plant species based on image analysis. The plant leaf images are segmented and the feature extraction algorithm is used to extract leaf shape and texture features from leaf sample images. An artificial neural network classification method based on backpropagation error algorithm (BP algorithm) is proposed to recognize plant leaves. This paper studies the existing plant image location and recognition technology, and introduces deep learning theory. After that, the high dimensional expression of image features by artificial neural network in deep learning theory is analyzed. The existing ANN model is improved and some new techniques and methods are introduced to construct a new ANN model. The model unifies the processes of image segmentation, target feature extraction and target classification.

PAPER-5

Plant Species Recognition Using Morphological Features and Adaptive Boosting Methodology (2019).

Authors: MUNISH KUMAR, SURBHI GUPTA, XIAO-ZHI GAO AND AMITIJ SINGH

The paper uses a novel plant species classifier that recognizes the plant species in the image. Out of many features, leaf shape is a conspicuous element that most algorithms rely on to perceive and describe a plant. The system extracts the morphological features of the plant leaf and classifies using Multilayer Perceptron and other classification algorithm along with AdaBoost methodology. Different classifiers, i.e., KNN, Decision Tree and Multilayer perceptron are employed to test the accuracy of the algorithm. The authors have observed that the maximum precision rate of 95.42% has been achieved for 32 kinds of plant leaves and the proposed system has performed better than the existing techniques for plant leaf recognition.

PAPER-6

Bird Image Retrieval and Recognition Using a Deep Learning Platform (2019).

Authors: Yo-Ping Huang, Haobijam Basanta

The authors have developed a deep learning platform that helps users recognize various species of birds endemic to Taiwan. A mobile application named the Internet of Birds (IoB) is developed that recognizes 27 species of birds. The deep learning model for bird image classification using the CNN framework is described. Bird images were learned by a convolutional neural network (CNN) to localize prominent features in the images. The model established and generated a bounded region of interest to refine the shapes and colors of the object granularities and subsequently balanced the distribution of birds. Then, a skip connection method was used to linearly combine the outputs of the previous and current layers to improve feature extraction. Then it applied the softmax function to obtain a probability distribution of bird features. The platform uses cloud based deep learning for image processing to identify bird species from digital images. The proposed system could detect and differentiate uploaded images with an overall accuracy of 98.70%

PAPER -7

An Efficient Framework for Animal Breeds Classification Using Semi-Supervised Learning and Multi-Part Convolutional Neural Network (MP-CNN) (2019).

Authors: S.Divya Meena, L.Agilandeeswari

The paper focus on classifying 27 classes of animals with 35,992 training images. The proposed model classifies the animals on both generic and fine-grained level. It has built a semi-supervised learning based Multi-part Convolutional Neural Network (MP-CNN) with a hybrid feature extraction framework of Fisher Vector based Stacked Autoencoder. With Semi-supervised learning based pseudo-labels, the model classifies new classes of unlabeled images too. Hellinger Kernel classifier method has been modified and used to re-train the misclassified classes of animals which further enhance the accuracy. Semi-supervised learning based pseudo-labels, the model classifies new classes of unlabeled images too. The testing accuracy increases as the models get trained. The experimental results shows that the overall accuracy is 99.6%.

