Literature Survey

Digital Naturalist - AI Enabled tool for Biodiversity Researchers

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PAPER-1

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

Authors: MUNISH KUMAR, SURBHI GUPTA, XIAO-ZHI GAO AND AMITOJ 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-2

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 pretrained 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-3

Species determination using AI machine-learning algorithms: Hebeloma as a case study.

Authors: Peter Bartlett1et

In this paper, Peter Bartlett1et al (2022) proposed the work related to the species determination using AI and machine learning algorithms. They used the Hebeloma species as a case study and found that any species with sufficient datasets will find the best algorithm for processing it. The species identifier was able to identify 77% correctly with its highest probabilistic match, 96% within its three most likely determinations and over 99% of collections within its five most likely determinations. Each hidden layer has an activation function of either Rectified Linear Unit (ReLU) or Mish. The dimensionality of each hidden layer was set equal to the maximum of the dimensionality of the feature set and the dimensionality of the class.A total of five optimizers were used to minimise the loss function. For both the Adam and AdamW optimizers, the “AMSGrad” variation proposed was also evaluated.

PAPER-4

Animal classification system: a block-based approach. Procedia Computer Science.

Authors: Kumar YS, Manohar N, Chethan HK

This paper provides insight into a computer-assisted animal classification system from wildlife and field images. An experiment was conducted using 4000 sample images which consisted of 25 different classes of animals, for which each class varies from 40 to 300 images for the classification task. The images were taken to study the effect of the proposed method with large intra-class variations and different viewpoints. Classification of animals mainly had 3 stages viz, segmentation, feature extraction and classification. Segmentation is carried out to discard the background and obtain the region of interest with the animal in it. Iterated Graph Cuts algorithm is used for this task. Then feature extraction is performed using facial features, body shape and colour texture moments making use of local Fourier transform. Then classification is done using K- Nearest Neighbour (KNN) and Probabilistic Neural Networks (PNN). The performance of different classifiers for the classification of animal images is documented and the results are favourable for KNN classifiers to achieve relatively higher accuracy in all cases.

PAPER-5

"Deep Learning for Plant Identification in Natural Environment", Computational Intelligence and Neuroscience, vol. 2017, Article ID 7361042, 6 pages, 2017.
https://doi.org/10.1155/2017/7361042

Authors: Yu Sun, Yuan Liu, Guan Wang, Haiyan Zhang

Yu Sun et al. have proposed a deep learning model containing 26 layers and 8 residual building blocks for uncontrolled plant identification, designed for large-scale plant classification in the natural environment. They have used the BJFU100 dataset containing 10,000 images, collected by mobile phones, of various plant species from the Beijing Forestry University. The 26-layer residual network i.e., the ResNet26 model is mainly designed using bottleneck building blocks. The input image is fed into a 7 × 7 convolution layer and a 3 × 3 max pooling layer followed by 8 bottleneck building blocks. Using SGD optimization, the proposed ResNet26 model results in 91.78% accuracy. This is also seen to be significantly higher than the ResNet18, ResNet34, and ResNet50 models which yield a test accuracy of 89.27%, 88.28%, and 86.15%, respectively. They have also tested the ResNet26.

PAPER-6

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 variouslengths 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.