Literature Survey

[1] Ghosh S et al. carried out a survey of different classification techniques such as Principal Component Analysis (PCA), Decision Tree, Naive-Bayes classifier (NBC), Bayesian Classification, Probabilistic Neural Network, Support Vector Machine, Artificial Neural Networks, k-Nearest Neighbours, Genetic Algorithm and Learning Vector Quantization. (LVQ). They have also explored classifier combinations and combining methods. The classifier contains four levels which include the combiner level, classifier level, feature level and data level. After exploring the features and drawbacks of each algorithm, they have concluded that a combination of SVM, k-NN and PNN is best suited for classifying plant images. k-NN is chosen as it is simple, PNN training is easy and spontaneous, and SVM is chosen as it is easy to control the complexity of decision rule and frequency errors.

[2] Borugadda et al. have conducted a study to predict the optimal model among AlexNet and other machine learning models, to classify cotton diseases based on the extracted image features. An open-access cotton disease dataset, collected from the website of Kaggle is used for training and validating the AlexNet model. The first part of the study is the feature extraction phase and the second part is the classification phase. Five convolutional layers of the AlexNet model are used to extract the image features, and those features are fed to three fully connected layers of AlexNet and other machine learning algorithms for classifying the cotton leaf disease classes. Among the three fully connected layers, the first and second layers are hidden layers, and the third layer is the output layer with four classes. Since the given dataset is of imbalanced data, the optimal deployment model is chosen based on the macro F1_score. Therefore, the study concludes that the AlexNet model gives the best result among all classification models with an F1_score of 94.92%.

[3] 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 model on the public Flavia dataset with 1907 images and achieved an accuracy of 99.65%.

[4] Forrest Sheng Bao et al. employed a Probabilistic Neural Network for automated leaf recognition for plant classification. PNN is chosen as the artificial neural network as its training is easy and instantaneous. The network classifies the input vector into a specific class because

that class has the maximum probability to be correct. Based on 5 basic geometric features, 12 digital morphological features were defined as the leaf features. They have used Principal Component Analysis (PCA) to orthogonalize the 12 features which form the input vector of PNN. The PNN has three layers: the Input layer, Radial Basis Layer and the Competitive Layer. The network is trained with 1800 leaf images sampled in Nanjing University and Sun Yat-Sen arboretum, Nanking, China. Their model can classify 32 kinds of plants and their experimental result indicated that their algorithm is workable with an average accuracy of 90.312%.

[5] 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.

References

[1] Ghosh S, Kumar H, Nayak JS. Study on Classification of Plants Images using Combined Classifier. International Journal. 2015 Apr;3(4).

[2] Borugadda, P., Lakshmi, R., & Govindu, S. (2021). Classification of Cotton Leaf Diseases Using AlexNet and Machine Learning Models. Current Journal of Applied Science and Technology, 40(38), 29-37. https://doi.org/10.9734/cjast/2021/v40i3831588

[3] Yu Sun, Yuan Liu, Guan Wang, Haiyan Zhang, "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

[4] S. G. Wu, F. S. Bao, E. Y. Xu, Y. Wang, Y. Chang and Q. Xiang, "A Leaf Recognition Algorithm for Plant Classification Using Probabilistic Neural Network," 2007 IEEE International Symposium on Signal Processing and Information Technology, 2007, pp. 11-16, doi: 10.1109/ISSPIT.2007.4458016.

[5] Kumar YS, Manohar N, Chethan HK. Animal classification system: a block-based approach. Procedia Computer Science. 2015 Jan 1;45:336-43