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Automated Plant Species Identification on Leaves Through Image Processing Techniques

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Abstract:

This paper represents a novel approach to automated plant species identification based on leaf images using advanced image processing techniques. The proposed method integrates machine learning algorithms and computer vision methods to accurately classify plant species from leaf characteristics captured through imaging technology. image processing methods and their identity on ground and many areas, The system aims to revolutionize botanical research, agricultural management, and ecosystem monitoring by providing a rapid and efficient tool for plant species identification.

KEYWORDS: 1. computer vision for identify plant species, **2.** ecosystem monitoring, **3.** Revolution botanical study, **4.** Agriculture management.

Introduction:

To the grandness of flora species recognation in various field such as agriculture, ecology, and biodiversity conservation. Overview of traditional methods for botanical species recognation and the automation through image processing. Dataset classification of the leaf. introduction to image processing techniques and their potential applications in botanical species recognation on leaves.

Literature Review:

Gaju Chavan1, Sonali Kulkarni2 - "Identification of Plant Species using Remote Sensing Techniques: A Review" Currently most of researchers use the remote sensing techniques for plant identification. paper will be useful for new researchers to understand the plant identification system using remote sensing techniques.

Girma Tariku 1,- "Automated Identification and Classification of Plant Species in Incongruous Plant Areas Using Unmanned Aerial collection of vehicle RGB Images and Transfer Learning" This article recounts a method for the exact recognition and category of botanical species in Incongruous areas using UAV-collection RGB images, plant mapping techniques, and transfer learning. Consider focus challenges in realistic species identifications inside diverse environments, focuses on body of data acquisition, preparations and epitome selection.

Xuan Wang 1 et al.,-"Leaf Recognition Based on Elliptically Half Gabor and Maximum GPS Pattern " We have proposed a novel counting-based leaf recognition method based on the elliptically half Gabor wavelet and gaps local line directions descriptors. The advantages of our methods over the state of the art leaf

No	Plant name	Scientific name	Class	Genus	Order	Family	Phylum
1	Coleus	Plectranthus app.	Mangoliopsida	Coleus	Lamiales	Lamiaceae	Tracheaophyta
2	Zebra plant	Calanthea zebrina	Liliopsida	Geoppersia	Zingiberales	Marantaceae	Tracheaophyta
3	Basket plant, chain plant inch plant	Callisia fragrans	Liliopsida	Callisia	Commelinales	Commelinaceae	Tracheaophyta
4	Moringa, Drumstic , moringa	Moringa Oleifera	Mangoliopsida	Moringa	Brassicales	Moringaceae	Tracheaophyta
5	Mango	Mangifera indica	Mangoliopsida	Mangifera	Sapindales	Anacardiaceae	Tracheaophyta
6	Sugar apple, custard apple, sweetsop	Annona squamosa	Mangoliopsida	Annona	Mangoliales	Annonaceae	Tracheaophyta
7	Neem	Azadirachta indica	Mangoliopsida	Azadirachta	Sapindales	Mediaceae	Tracheaophyta
8	Arjun, white murdh, kumbuk	Terminalia Arjun	Mangoliopsida	Terminalia	Myrtales	Combretaceae	Tracheaophyta
9	Butterfly- pea	Clitoria ternatea	Mangoliopsida	Clitoria	Fabales	Fabaceae	Tracheaophyta
10	Tulsi, tulasi	Ocimum tenuiflorum	Mangoliopsida	Ocimum	Lamiales	Lamiaceae	Tracheaophyta
11	Crape-jasmine, butterfly-gardenia	Tabernaemontana	Mangoliopsida	Tabernaemontana	Genetianales	Apocynaceae	Tracheaophyta
12	Butternut squash, pumpkin, Spanish guard	Cucurbita moschata	Mangoliopsida	Cucurbita	Cucurbitales	Cucurbitaceae	Tracheaophyta
13	Shoeflower, Chinese hibiscus, tropical hibiscus, red hibiscus, shoeblackplant, tricolor hibiscus	Hibiscus rosa-sinensis	Mangoliopsida	Hibiscus	Malvales	Malvaceae	Tracheaophyta
14	Medlar, tanjongtree, Spanish-cherry	Mimusops elengi	Mangoliopsida	Mimusops	Ericales	Sapotaceae	Tracheaophyta
15	Marigold,	Tagetes erecta	Mangoliopsida	Tagetes	Asterales	Asteraceae	Tracheaophyta

	(genda phool), french marigold						
16	Pothosi, devil's-ivy, golden pothos	Epipremnum pinnatum	Liliopsida	Fpipremnum	Alismateles	Araceae	Tracheaophyta
17	Four-leaf devil-pepper, milk bush, devil-pepper	Rauvolfia tetraphylla	Mangoliopsida	Rauvolfia	Genetianales	Apocynaceae	Tracheaophyta

recognition methods are 1.)direct and effective combination of all three kinds of leaf images; 2.) high adaptability for various complicated conditions and diversified characteristics; 3.)high feasibility due to working directly on rawish grayscale leaves images without the needs for a preprocessing process.

Muhammad Azfar Firdaus Azlah 1-"methods for Plant Leaf Classification and Recognition" Some reliable automation procedures are used for leaf pattern recognition. paper mainly review the additional benefit of every one classifiers and compare their compatible with differently leaf features conceding processes. A machine vision approach which can completely neglectable the downplay of the photo is hurrying up the conceding process and its suitable for extreamly complex plant leaves samples.

Surleenkaur 1-"Plant Species detection based on Leaf Using machine Vision and Machine Learning Techniques" This paper has proposed an automatic plant species detection approach which is employed using computer vision and machine learning methods to classification the plant leaf images.

Lukas Picek 1-"Plant realization by AI:Deep neural nets, transformers, and kNN in deep embeddings" assessed impulsive plant detection as a good classification undertaking on the largest accessible plant realization dataset coming from the LifeCLEF and CVPR_FGVC workshops, counting until 10,000 plant species.

Jana Waldchen 1-"Automated plant species identification—Trends and future directions" This new process is proper, hence the detection requirement idle from the user except for picking a photo and brows the most similar species. Furthermore, least oracal knowledge is needed, especially essential given the day-to-day deficit of skilled botanists.

Methodology:

Description of the body of data used for experimentation the plant class detection system. Explanation of the image processing pipeline, including preprocessing, feature extraction, and classification.

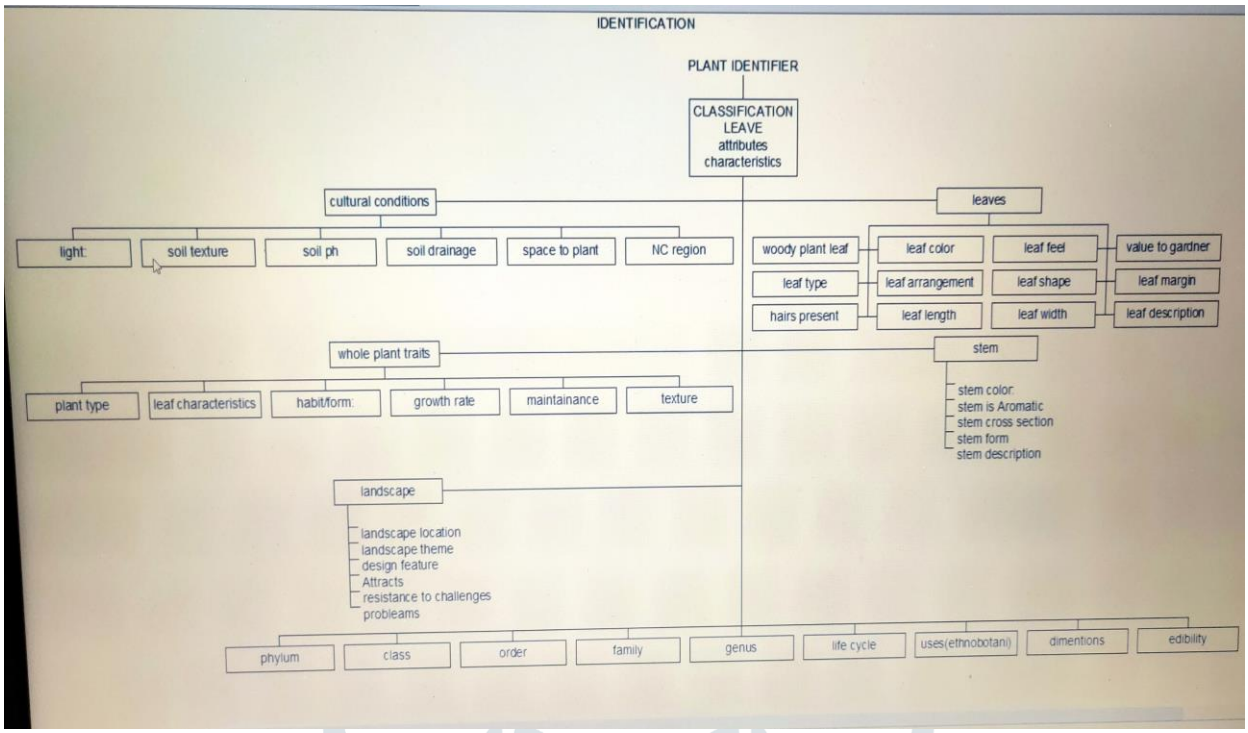
Overview of machine learning algorithms utilized for leaf classification, such as convolutional neural networks (CNNs), support vector machines (SVMs), or random forests.

Random Forest:A random forest is an ensemble learning method that combines the predictions from multiple decision trees to produce a more accurate and stable prediction. It is a type of supervised learning algorithm that can be used for both classification and regression tasks.

Details on the implementation of the proposed method and software tools used.

Organization Chart

Data Collection



Results:

Presentation of experimental results evaluating the production of the plant class detection system.

we have used 4 parameters in the evaluation methods - Accuracy, Precision, Recall and F1-score. those parameters were calculated a confusing matrix reporting the aggregate true positives(TP), true negatives(TN), false positives(FP) and false negatives(FP). the evaluation parameters were calculated using

accuracy = TP+TNTP+TN+FP+FN

precision =TPTP+FP

recall =TPTP+FN

F1-score=2.precision.recallprecision+recall

an external file hold as image.

Evaluation matrix.Comparison with existing methods or benchmarks, if applicable.

Discussion of the strengths and limitations of the proposed to image approach.

Discussion:

Interpretation of the results and implications for plant biology, agriculture, and environment science. Potential applications of the automated plant wild type detection system in real-world scenarios.

Conclusion:

Summary of the key findings and contributions of the research. Reiteration of the automated plant species identification for the importance for botanical studies. leaf image insertion finding the texturing of the plant and their characteristics, features, as attributes, atmosphere and humans connections. Final thoughts on the potential impact of the presumed method and avenues for further exploration. identity for leaves origin and types of plants and their finding area, margin and stem quality and enhancement of the basic of leaves.

References:

1. GajuChavan[1], Sonali Kulkarni[2] 2023 Identifications of Plant wild type using Remote Sensing Techniques: A Review .
2. Girma Tariku[1] et al. 2023 Impulsive Identification and Classifications of Plant Species in variety Plant Areas Using nervous Aerial Vehicle-Collected RGB Images and Transfer Learning.
3. Xuan Wang[1] et al. 2019 Leaf Recognition Based on Elliptical Half Gabor and Maximum Gap Local Line Direction Pattern .
4. Muhammad AzfarFirdausAzlah [1] et al. 2019.Review on Techniques for Plant Leaf Classification and Recognition .
5. Xiaobo Yang [1],[2] et al. 2014. Instance Segmentation and Classification Method for Plant Leaf Images Based On ISC_MRCNN and APS-DCCNN First A..
6. Jana Waldchen[1],[2], et al. 2022. Towards more effective identification keys: A study of people identifying plant species characters.
7. Surleen Kaur[1], Prabhpreet Kaur[2], 2019 Plant Species Identification based on Plant Leaf Using Computer Vision and Machine Learning Techniques.
8. Lukas Picek[1], et al. 2022 Plant recognition by AI: Deep neural nets, transformers, and kNN in deep embeddings.
9. Jana Waldchen[1], et al. 2018 Automated plant species identification—Trends and future directions.
10. Katherine James | Karen Bradshaw, 2020 Detecting plant species in the field with deep learning and drone technology.