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A SURVEY ON PLANTATION DATABASE

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Abstract: Data Volume and Scalability: The sheer volume of plant-related data, including genomic information, presents challenges in terms of storage, processing, and retrieval. Scalability is a critical consideration as databases continue to grow. Interdisciplinary Integration: Plant databases often require collaboration between experts from diverse fields, including botany, genetics, ecology, and informatics. Bridging these interdisciplinary gaps is essential for comprehensive database development. Sustainability and Funding: Sustainable management of database content is a major challenge.

Keywords: Plantation, Environment, Eucalyptus, Hainan, oil palm plantation, Mapping and monitoring.

I. INTRODUCTION

Humanity has always been captivated by the world of plants, which are made up of an incredible variety of species, because of their inherent beauty as well as their essential function in maintaining life on Earth. It is imperative to comprehend and utilize the abundance of data related to plants in order to tackle worldwide issues like healthcare, environmental preservation, and food security. In this attempt, a Plant Database is an essential resource that acts as a central hub for gathering, organizing, and distributing information about plant life.

IMPORTANCE OF PLANT DATABASE :

Conservation of Biodiversity: Plant databases play a major role in recording and safeguarding biodiversity. These databases help conservationists discover endangered species and develop methods for their protection by classifying different plant species and their distribution.

Plant databases are a useful resource for learning about crop traits, genetic diversity, and pest resistance in the field of agriculture. This knowledge can be used by farmers and researchers to improve agricultural technique and increase crop yields.

Research on Pharmaceuticals and Medicines: Many plants contain chemicals that may have therapeutic benefits. Plant databases are essential for the identification of new medications since they store data about the bioactivities, traditional medicinal applications, and secondary metabolites of plants.

Environmental Monitoring: Determining the general health of ecosystems requires an understanding of how climate change affects plant life. Plant databases record shifts in plant phenology, distribution, and adaptation, which helps with environmental monitoring.

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II. LITERATURE REVIEW

SL NO	YEAR OF PUBLICATION	PROJECT TITLE	DESCRIPTION
1	2022 [1]	Mapping and Monitoring Forest Plantation using Fraction Images Derived from Multi-Annual Landsat TM Datasets.	An approach of mapping the area covered by forest plantations in Sao Paulo State, Brazil, is described in this article. The suggested technique uses the Linear Spectral Mixing Model (LSMM) to extract yearly pictures of the vegetation, soil, and shadow fraction for local study from Landsat Thematic Mapper (TM) datasets.It was made by use of 30 m yearly mosaics of TM photos from 1985 to 1995. The benefit of using fractional pictures is that they highlight the desired attributes while requiring less data to be examined. Then, in order to make it easier to classify the areas covered by forest plantations, created a single mosaic for each percentage of photos in the TM dataset by computing the maximum value during this time. Two forest plantation classes might be classified using the suggested method: Equalypt and Pine. In addition, it allowed to monitor the phenological stages of Eucalypt according to its growth cycle [1].
2	2021 [2]	Machine Learning Approach for Tree Plantation Suitability Mapping.	Choosing the right location for a forest plantation is one of the difficulties in creating a successful one. This study used MaxEnt, a machine learning Species Distribution simulate (SDM) based on Maximum Entropy principles, to map and simulate the suitability of Falcata plantations in the Caraga Region of Mindanao, Philippines. The average training and test Area Under the Curve (AUC) values of 0.78 and 0.76 indicated that the model performed satisfactorily. The model was used to create a Falcata suitability map of one kilometer.The relative contributions of several environmental factors to the Falcata suitability distribution were also discovered using it [2].
3	2020 [3]	U-Net with Spatial Pyramid Pooling Module for Segmenting Oil Palm Plantations.	One of the most vital commodities for Malaysia's economy is palm oil. The government, which is the world's second-largest supplier of palm oil, has established a number of laws and guidelines to support environmental friendly farms. However, some parties may use the regulations to their advantage by growing their own plantations larger than what is allowed. In this study, a deep neural network segmentation method is suggested as a remote sensing strategy to autonomously monitor the plantation size. To increase the accuracy of segmentation, the well-known U-Net architecture is coupled with the spatial pyramid pooling (SPP) module. By altering the kernel size used to down sample the input layer, many U-Net variations using the SPP module are investigated. Right before the bottleneck is where the SPP module is located. In between the encoder and decoder sides of the network [3].

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4	2019 [4]	Pixel-based Remote Sensing Data Processing for Estimating Rubber Plantations Productivity.	One of the plantation commodities that is crucial to Indonesia's economy is rubber plants. The world's largest rubber plantation is located in Indonesia. The utilization of remote sensing data is one quick and reliable way to get information on rubber plantation sites. The purpose of this study is to compare production data measured in the field with the outcomes of production estimations made using remote sensing data. Regression correlation statistical data analysis and remote sensing are the research methods employed. ASTER imagery in the visible and near-infrared channels is used.The outcome of the relationship that exists between the SAVI vegetation transformation index's value and the width of the canopy shows that the two variables are related to each other. This is indicated by the magnitude of the value of R2(How much of the variation of a dependent variable) on the correlation results of these two variables at 0.709 [4].
5	2018 [5]	Functionality Test of Communication Systems based on LoRa Technology in Oil Palm Plantations Area.	SSB (Side band modulation)radios or handy-talkies are still often utilized in the communications infrastructure of Indonesia's oil palm farms. Cell phones linked to the networks of telecommunication companies are used for communications in some heavily populated regions. However, the majority of Indonesia's oil palm plantations are situated in isolated, rural areas devoid of network infrastructure.They anticipate that oil palm farms will be able to employ the OWNGrid product as an alternative to long-range communication devices. Utilizing a smartphone with dedicated Android applications for chat services, OWNGrid employs LoRa technology as its foundation. With any luck, it will contribute to increased efficacy(The ability of something like a drug or a medical treatment) and efficiency in oil palm harvesting [5].
6	2017 [6]	Development of RESTful API to support the oil palm plantation monitoring system.	Using the Resource-Oriented Architecture (ROA)-Slim Framework, a RESTful API (Representational State Transfer Application Programming Interface) is constructed in this study to serve as a service provider of data resources of oil palm plantations . As a result of this development, a number of URI that provide access to data resources about the state of the plantation environment in support of the oil palm plantation monitoring system may be created. Based on the functional test results, it was determined that API, serving as the plantation's monitoring system's support, had satisfied all of the necessary requirements for the process of keeping an eye on the environment's oil palm conditions in compliance with the design specification mentioned in the needs identification [6].

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7	2016 [7]	Model assessment of land suitability decision making for oil palm plantation.	When clearing land for oil palm plantations, one useful technique for managing the natural resource is the Model Assessment of Land Suitability (MAOLS). A decision support system (DSS) addressing the problem of clearing land for oil palm plantations uses this approach. Since the goal of this problem is to prevent excessive land removal, effective analysis is required while making decisions. The DSS model was used to Multi-criterion Decision Making (MCDM) with four oil palm plantation options, utilizing the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) technique for 14 parameters on the land's class criterion. Using direct weighing on TOPSIS, the initial testing phase identified the fourth land as having the potential for oil palm plantations clearing with the scoring values are 0.578. The second stage of the Analytical Hierarchy Process method is used to determine the effectiveness of the proposed model [7].
8	2015 [8]	Yearly Variation of Acacia Plantation Forests Obtained by Polarimetric Analysis of ALOS PALSAR Data.	Microwave remote sensing applications have gained widespread acceptance in forest management yet, the mechanisms behind microwave backscattering in plantations are still poorly understood. This study looks at backscattering properties in plantation forests of quickly growing acacia trees in Sumatra, Indonesia, under various forest structural circumstances. To see the fluctuations of the acacia plantation, ALOS PALSAR data obtained between 2007 and 2010 was subjected to a general four-component scattering power decomposition approach. The data from the forest inventory, which included eye evaluations of stand conditions, was compared with the annual variance in decomposition powers. The outcomes showed strong agreement with the data collected in the field. Decomposition power fluctuation patterns allow us to discern between damaged and healthy stands, as well as to detect the presence of understory. Additionally, the PALSAR data analysis can show damages within a forest compartment, even minor damage in younger forests [8].
9	2014 [9]	Object-oriented classification of rubber plantations from Landsat satellite imagery.	A growing number of formerly unsuitable places have seen the rise of rubber (Hevea brasiliensis) plantations due to the growing demand for natural rubber products worldwide. Unfortunately, the lack of precise maps of rubber plantations significantly limits our ability to comprehend the socioeconomic and environmental effects of plantation expansion. The rubber plantations at Yangjiang State Farm on Hainan Island were precisely mapped from Landsat satellite data in 2010 using an object-oriented classification algorithm. The findings indicate that: (1) Yangjiang State Farm's rubber plantation area was assessed at 5866 hm^2 in 2010, which was somewhat larger than the data from the stand inventory in 2009 (5190 hm^2). (2) The confusion matrix indicates that the generated map of rubber plantations has a good accuracy. The overall accuracy is 90% and the kappa coefficient is 0.9. It showed that object-oriented classification method is suitable for mapping rubber plantation from Landsat satellite imagery [9].

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10	2013 [10]	Investment decision-making method of Eucalyptus plantation based on real options theory.	This article uses option pricing theory to address the shortcoming of the traditional investment decision-making process, which uses net cash flow as its primary metric and is aimed at evaluating the project's uncertainty value. The project in question is a eucalyptus plantation project with long-term, uncertain, stage, and other characteristics. The study demonstrated that the option pricing theory, represents the project's genuine objective value, properly captured the uncertainty value of the eucalyptus plantation project in comparison to standard cash-flow theory [10].
11	2012 [11]	Contrast research on the soil moisture environment between artificial coconut grove and eucalyptus plantation in Danzhou Forest Farm, Hainan.	Danzhou Forest Farm, located in the western region of Hainan, China, has a larger and more continuous eucalyptus planting area. Four-year-old eucalyptus forest and artificial coconut grove were chosen as research sites for comparison because of their proximity and similar natural surroundings. Comparing the differences in the soil moisture environment between eucalyptus plantations and artificial coconut groves using ongoing field-point sampling. The findings indicate that: 1) For plots with eucalyptus trees, the average soil moisture content is 6.66%, 9.71%, and 9.67%; for plots with coconut groves, the average soil moisture content is 7.19%, 10.04%, and 11.31%. 2) Throughout the whole dry and wet seasons, the average soil moisture contents of eucalyptus forest plots are, respectively, 0.84%, 0.67%, and 1.02% lower than those of coconut grove plots.3) The annual range of variation of eucalyptus plantation's soil moisture is 3.77%, and that of artificial coconut grove is 3.18%. In similar natural conditions, eucalyptus forests' average soil moisture contents are less than coconut grove [11] .
12	2011 [12]	Effects of forest ages on spring soil moisture environment of eucalyptus plantations in the western part of Hainan Island.	In Mainland China, more than two million hm of eucalyptus trees have been planted in recent years, with Hainan being one of the most significant regions. Although eucalyptus plantations generate significant revenues, a number of pertinent ecological issues have given rise to scholarly debates. In Hainan's west and southwest, the yearly rainfall is roughly 1000 mm, and the drought severity index is higher than 2. As the eucalyptus pulp plantation project moves on, all of the trees will be removed at one time every five to six years, and the regional hydrology and soil ecology will be greatly impacted by multigenerational continuous planting rotations. Danzhou Forest Farm, located in Hainan's west, was selected as the primary research region to highlight the spatial [12].

III. CONCLUSION

In conclusion, plant databases are essential resources that significantly contribute to expanding our knowledge of plant life and solving urgent worldwide issues. Plant databases have a wide range of uses, from agricultural innovation and medicine discovery to biodiversity protection. To guarantee the ongoing effectiveness of these essential tools, however, issues like data quality, multidisciplinary collaboration, and sustainability need to be addressed. The field of plant databases will continue to grow as worldwide collaboration and technological advancements progress, providing fresh opportunities for environmental stewardship, teaching, and research.

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