Growth Prediction, Diseases Detection & Classification System for Anthurium Plants

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DECLARATION

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Abstract

Agriculture is the main incoming industry for most of the Asian countries like Sri Lanka, India. Within past few decades, Technology has developed very vastly. But the connection between agriculture and people in Asian countries have not changed much so far. With the development of information technology, researchers try to apply the technological knowledge to different fields for having efficient and accurate results. As a result of that researchers have introduced new concepts and products to agriculture field also.

In this research, we are focusing on helping planters who are having lack of knowledge of technology and seeking more accurate and more efficient methods in new technology for maintaining large plantations rather than using conventional methods. Because they may have fed up by using conventional methods, because they are more time consuming and more inaccurate methods. So 'Agro' system is developed for helping growers for maintaining their large plantations without more user involvement.

Agro is a system developed for embedded platforms, simply it takes an images from the plantation and then extracts features for further processes such as predict the green area of the plantation, risk management of the plantation and disease detection and informing the necessary steps to take further. Image processing is the backbone of this project which helps to implement the system further more. So in this discussion, mainly focusing on the image processing part that how it involve to implement the 'Agro' system further more.

ACKNOWLEDGMENT

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1. INTRODUCTION

'Agro' is a system developed in an embedded platform which will run without any user involvement. It is mainly focusing on Anthurium growers who are maintaining large scale plantations. Most of the people who are engage in cultivating plants like Anthurium for large scale because it provides a more valuable way to spend their leisure time and it's a good way to earn money. Those who are maintaining plantations in a large scale, are intended for exporting the plants. So 'Agro' is a more reliable solution to predict the green area of the plantation with respect to environmental conditions, risk management and disease detection of the plants in the plantation. Image processing is the backbone process behind the implementation of the 'Agro' system which is needed to be discussed more for the sake of better development of the system.

1.1. Problem to be addressed

'Agro' system is developed for as a solution to problems in plantations who are maintaining in a large scale. But most of the researches have implemented solutions for considering plants individually. And they have used plain background to clearly identify the leaf area and disease spots which makes the implementation so easy. But for this research, it is more important implementing the image processing part more accurately for the system which helps for implementing further functionalities for the system. The problem to be addressed is in the image processing part is identifying spots and leaf area more accurately from the images which is taken under natural environment.

2. METHODOLOGY

Agro is a standalone application which runs in an embedded platform. Agro is specially implement for Anthurium growers who maintains large scale plantations for business purposes and specially it will be useful for researchers who are conducting researches about the spreading of the Anthurium diseases against the changes of the environmental conditions like humidity, sun light, temperature.

Requirement gathering

Requirements were gathered by using,

- Referring online materials such as web articles, tutorials, videos, research papers and journal papers based on image processing in leaf disease detection and growth prediction.
- Referring online materials such as tutorials, videos and web articles on setting up embedded platform and sensors.
- Meeting Gampaha Botanical Garden officers for gathering useful information about infected Anthurium plants.
- Gathered more useful and practical knowledge through mails from Professor Pathmanathan Umaharan who is a director in Cocoa research Centre at the university of the West Indies, St. Augustine, Trinidad and Tobago ,about botany side of this project to implement the Agro, more practical and successful way.
- Collecting images mainly for leaves (Collecting images for spathe and spadix also.) with sensor readings during several times in a day and keep taking images every day for the successful data collection.

The requirement and information gathered from local and foreign professionals and researches, as developers we were able to develop the system in a more practical and useful way. The system first extracts different features using captured images of Anturium plants to train three different neural networks. The extracted features are the inputs of neural networks which is used for growth prediction, risk management and disease detection and quantification purposes.

2.1. Testing and Implementation
2.1.1. Research findings

In this project, we finalized the system features that need to be implement in the Agro system which runs in an embedded platform by the gathered information from local and foreign professionals. Then gathered information about past researches by referring research papers and decided to extract features such as green area, number of spots, spot diameter, spot colour and spot area for the further processes. And gathered information about the methodologies used by different researches. Past researches were done feature extraction part by using plain background. Because of that when the image is binarized, the objects in an image can be clearly identified as light foreground area which is surrounded by dark background area. But when it comes to implementation of 'Agro' system, it became more complex task to extract features from an image which is taken from natural environment conditions. So we focus on the methods to implement the system to detect the object that need to be extract features more accurately.

3. RESULTS AND DISCUSSIONS

Results are the evidence that end users and evaluators can be verify and validate the end product and the process. Results and discussions are uses to clearly understand the concept behind the project development.

Total number of images taken	More than 150 images
Features extracted	Leaf area (green area)
	Number of spots
	Spot area
	Spot diameter
	Spot colour

4. CONCLUSIONS

This research mainly focus on managing large scale plantations and it also helps botany researchers who are doing researches about the severity of the diseases with respect to environmental conditions. This research is focus on Anthurium but this can be applied to any kind of plantations. The product we are introducing is developed in embedded platform. It can be run without any user involvement.