International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 04 | Apr 2021 www.irjet.net p-ISSN: 2395-0072

FAILURE DETECTION FROM PADDY CROPS USING IMAGE PROCESSING TECHNIQUES

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Abstract - Agriculture is vital to the food security and economic growth of most countries in the world, especially in developing countries. Accurate information on field boundaries has considerable importance in precision agriculture and greatly assists land administration systems. The information obtained from field boundaries can provide valuable input for agricultural applications like crop monitoring and yield predictions. Farm field information extraction is an important task and is highly related to food security. Farm field boundaries can be delineated by conventional field surveying methods or by digitizing satellite imagery manually. However, this approach is time consuming, costly and highly dependent on the operator's capability of digitization and interpretation. Low and medium resolution satellite images have limited capacity to offer accurate information for field level. Detection of rows in paddy crops planted as rows is fundamental to site specific management of agricultural farms. Unmanned Aerial Vehicles are increasingly being used for agriculture applications. Images acquired using Low altitude remote sensing is analyzed. In this project we propose the detection of rows in an open field paddy crop by analyzing images acquired using remote sensing from an Unmanned Aerial Vehicle. The Unmanned Aerial Vehicle used is a quad copter fitted with an optical sensor. The optical sensor used is a vision spectrum camera. Spectral-spatial methods are applied in processing the images.

1. INTRODUCTION

1.1 IMAGE PROCESSING TECHNIIQUES

In imaging science, image processing is processing of images using mathematical operations by using any form of signal processing for which the input is an image, a series of images, or a video, such as a photograph or video frame; the output of image processing may be either an image or a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. Images are also processed as three-dimensional signals with the third-dimension being time or the z-axis. Image processing usually refers to digital image processing, but optical and analog image processing also are possible. This article is about general techniques that apply to all of them. The acquisition of images (producing the input image in the first place) is referred to as imaging.

1.2 STEPS OF IMAGE PROCESSING

Image Acquisition

This is the first step or process of the fundamental steps of digital image processing.

Image Enhancement

Image enhancement is among the simplest and most appealing areas of digital image processing.

Image Restoration

Image restoration is an area that also deals with improving the appearance of an image.

Color Image Processing

Color image processing is an area that has been gaining its importance because of the significant increase in the use of digital images over the Internet.

Wavelets and Multi-resolution Processing

Wavelets are the foundation for representing images in various degrees of resolution.

Compression

Compression deals with techniques for reducing the storage required to save an image or the bandwidth to transmit it.

Morphological Processing

Morphological processing deals with tools for extracting image components that are useful in the representation and description of shape.

1.3 SEGMENTATION

In computer vision, image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super-pixels).

a)Region Based:

In this technique pixels that are related to an object are grouped for segmentation.

b) Edge Based

Segmentation can also be done by using edge detection techniques. In this technique the boundary is identified to segment

c. Threshold:

Thresholding is the easiest way of segmentation. It is done through that threshold values which are obtained from the histogram of those edges of the original image.

CHAPTER 2

2. LITERATURE SURVEY

2.1 TITLE: RULE BASED APPROACH TO DETERMINE NUTRIENT DEFICIENCY IN PADDY LEAF IMAGES

AUTHOR: LATTE, M.V

Image processing applications in agriculture sector is advancing with new techniques. Some applications include fruit grading, weed detection, crop detection, crop management etc.

2.2 TITLE: STUDY OF DIGITAL IMAGE PROCESSING TECHNIQUES FOR LEAF DISEASE DETECTION AND CLASSIFICATION

AUTHOR: GITTALY DHINGRA

This paper highlighted the concepts and techniques used by various researchers to identify and classify diseases, challenging issues and problems.

2.3 TITLE: SEMI-SUPERVISED ONLINE VISUAL CROP AND WEED CLASSIFICATION IN PRECISION FARMING EXPLOITING PLAN ARRANGEMENT

AUTHOR: PHILIPP LOTTES

Moving towards a sustainable agriculture is one of the 17 sustainable development goals of the United Nations.

2.4 TITLE: DETERMINATION OF CROP ROWS BY IMAGE ANALYSIS WITHOUT SEGMENTATION

AUTHOR: H.T. SØGAARD

A method based on computer vision for detection and localization of crop rows, especially of small-grain crops, is described.

2.5 TITLE: CROP ROW DETECTION IN MAIZE FIELDS INSPIRED ON THE HUMAN VISUAL PERCEPTION

AUTHOR: J.ROMEO

The increasing development of robotics equipped with machine vision sensors applied to Precision Agriculture is demanding solutions for several problems.

CHAPTER 3

PROPOSED SYSTEM

Today, UAVs are being increasingly used for Agriculture applications in remote sensing.

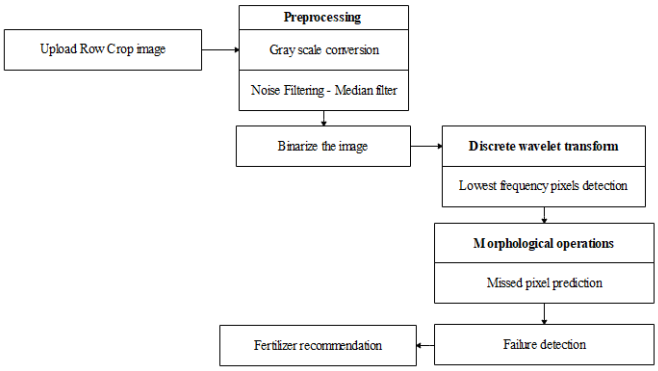
ADVANTAGES

- Classification accuracy is /high
- Reduce the false positive rate
- No need hardware to detect the failure.

CHAPTER 4

4. SYSTEM DESCRIPTION

4.1 SYSTEM OVERVIEW



In this architecture, we can implement the framework to analyze the failures in paddy crop.

4.2 MODULES DESCRIPTION

4.2.1 IMAGE ACQUISITION

In this module, we can input the UAV images. An unmanned aerial vehicle (UAV), commonly known as a drone is an aircraft without a human pilot aboard.

4.2.2 PREPROCESSING

In this module convert the RGB image into gray scale image. The colors of leaves are always green shades and the variety of changes in atmosphere cause the color feature having low reliability.

4.2.3 DISCRETE WAVELET TRANSFORM

Wavelet is a multi-resolution tool. Advantage of wavelet transform over the furior transform s, it having a sharp spikes and signal contain discontinuity.

4.2.4 MORPHOLOGICAL OPERATIONS

Morphology denotes a branch of biology that deals with form and structure of plants and animals.

4.2.5 FAILURE DETECTION

To check the robustness of the proposed method several UAV images at different image altitudes which in turn resulted in image pixel resolution are considered and the spectral-spatial classification is applied.

4.3 ALGORITHMS

4.3.1 DISCRETE WAVELET TRANSFORM

A discrete wavelet transform (DWT) is a transform that decomposes a given signal into a number of sets, where each set is a time series of coefficients describing the time evolution of the signal in the corresponding frequency band.

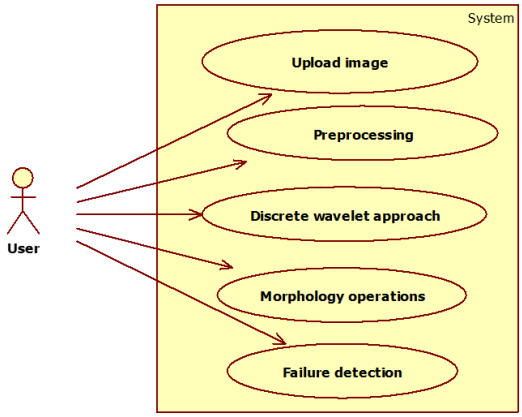
4.3.2 MORPHOLOGICAL OPERATIONS

Morphological techniques probe an image with a small shape or template called a structuring element.

UML DIAGRAMS

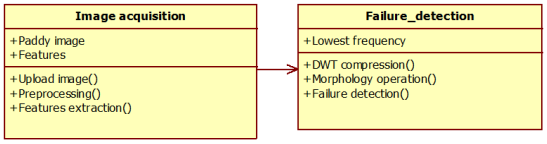
USE CASE DIAGRAM

Use case diagrams are usually referred to as behavior diagrams used to describe a set of actions (use cases) that some system or systems (subject) should or can perform in collaboration with one or more external users of the system (actors).



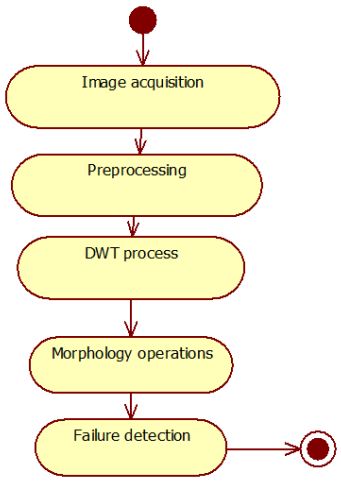
CLASS DIAGRAM

The class diagram is the main building block of object-oriented modeling.



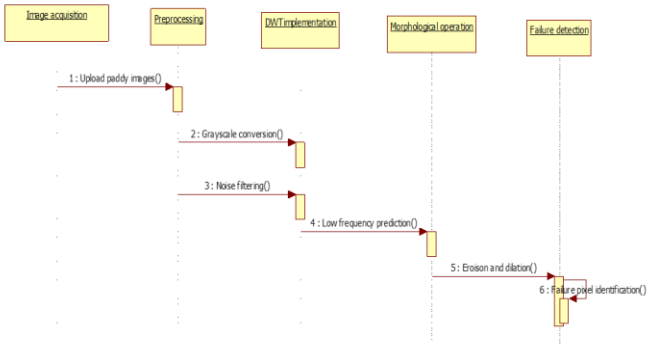
ACTIVITY DIAGRAM:

Activity diagram is another important diagram in UML to describe dynamic aspects of the system. Activity diagram is basically a flow chart to represent the flow from one activity to another activity.



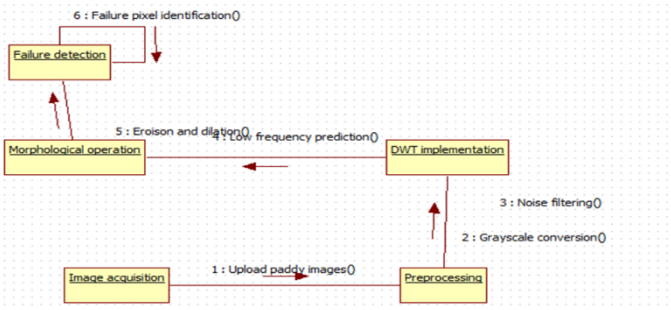
SEQUENCE DIAGRAM:

A Sequence diagram is an interaction diagram that shows how objects operate with one another and in what order. It is a construct of a message sequence chart. A sequence diagram shows object interactions arranged in time sequence.



COLLABORATION DIAGRAM

A collaboration diagram, also called a communication diagram or interaction diagram, is an illustration of the relationships and interactions among software objects in the Unified Modeling Language (UML).



CHAPTER 5

SYSTEM SPECIFICATION

5.1 SOFTWARE REQUIREMENTS

- Operating system : WINDOWS OS
- Front End : C#.NET
- Back end : SQL SERVER
- IDE : Visual Studio

5.2 HARDWARE REQUIREMENTS

- RAM : 1GB
- Hard disk : 160 GB
- Compact Disk : 650 Mb
- Keyboard : Standard keyboard
- Monitor : 15 inch color monitor

FRONT END: Net Framework

The .NET Framework (pronounced dot net) is a software framework developed by Microsoft that runs primarily on Microsoft Windows.

Design Features

Interoperability

Because computer systems commonly require interaction between newer and older applications, the .NET Framework provides means to access functionality implemented in newer and older programs that execute outside the .NET environment.

Common Language Runtime engine

The Common Language Runtime (CLR) serves as the execution engine of the .NET Framework.

Language independence

The .NET Framework introduces a Common Type System, or CTS.

Base Class Library

The Base Class Library (BCL), part of the Framework Class Library (FCL), is a library of functionality available to all languages using the .NET Framework.

Simplified deployment

The .NET Framework includes design features and tools which help manage the installation of computer software to

ensure it does not interfere with previously installed software, and it conforms to security requirements.

Security

The design addresses some of the vulnerabilities, such as buffer overflows, which have been exploited by malicious software. Additionally, .NET provides a common security model for all applications.

Portability

While Microsoft has never implemented the full framework on any system except Microsoft Windows, it has engineered the framework to be platform.

Common Language Infrastructure (CLI)

The purpose of the Common Language Infrastructure (CLI) is to provide a language-neutral platform for application development and execution.

Security

.NET has its own security mechanism with 2 general features: Code Access Security (CAS), and validation and verification.

Class library

The .NET Framework includes a set of standard class libraries. The class library is organized in a hierarchy of namespaces. Most of the built-in APIs are part of either System.* or Microsoft.* namespaces.

Memory management

The .NET Framework CLR frees the developer from the burden of managing memory (allocating and freeing up wen done); it handles memory management itself by detecting when memory can be safely freed.

SQL SERVER:

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database server, it is a software product with the primary function of storing and retrieving data as requested .

Concurrency and locking:

SQL Server allows multiple clients to use the same database concurrently. As such, it needs to control concurrent access to shared data, to ensure data integrity—when multiple clients update the same data.

The most critical parts of SQL Server

- SQL Server is anything but difficult to utilize.
- SQL Server scales from a portable tablet.

A database framework must give the accompanying elements:

- A mixture of client interfaces
- Physical information autonomy
- Logical information autonomy

Elements of SQL Server

Microsoft SQL Server bolsters a full arrangement of elements that outcome in the accompanying. SQL incorporates an arrangement of managerial and advancement instruments that enhance our capacity to introduce, convey, oversee and use SQL Server over a few locales.

Adaptability

The same database motor can be utilized crosswise over stages going from smart phones Microsoft Windows95 to substantial.

Ease in building information distribution centers

SQL Server incorporates instruments for removing and examining synopsis information for online investigative preparing (OLAP).

CHAPTER 6

6. CONCLUSION AND FUTURE ENHANCEMENT

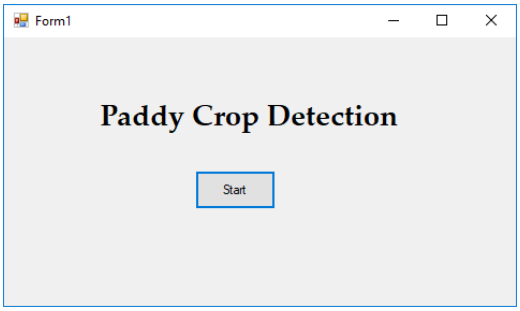
6.1 CONCLUSION

The developed method for detecting field boundaries in areas with heterogeneous landscape was not as successful as expected. The different approaches followed: extracting information from multiple bands, using texture bands or image bands in detecting field boundaries do not give good results. The capability of the algorithm in detecting the dominant orientation and the spacing between the crop rows was tested on four different subsets of the image. The algorithm can be modified and applied according to the required shape to be detected. The results of this research show that the adopted methodology has a good potential in detecting crop rows automatically from satellite images. However, it is important to note that the methodology was tested on different subsets of the same image but not on a different image.

6.2 FUTURE ENHANCEMENT

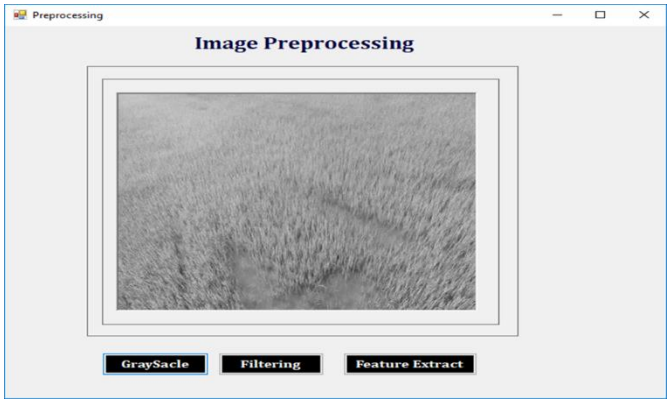
In future, we can extend the approach to implement various deep learning algorithms to detect the row crops with improved accuracy and also applied in various field applications.

SCREENSHOTS

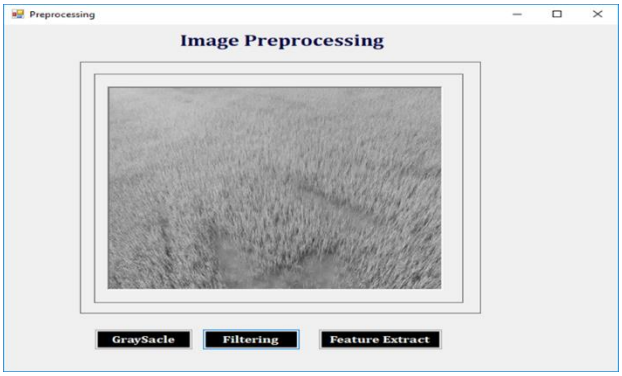


This screenshot is home page for the project. The home page is used to upload the image for paddy crops

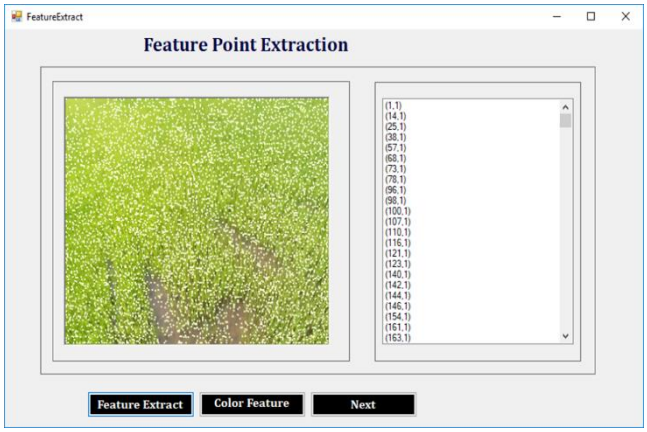
In this screenshot, we can upload the paddy crop image. Image can be any type and any size



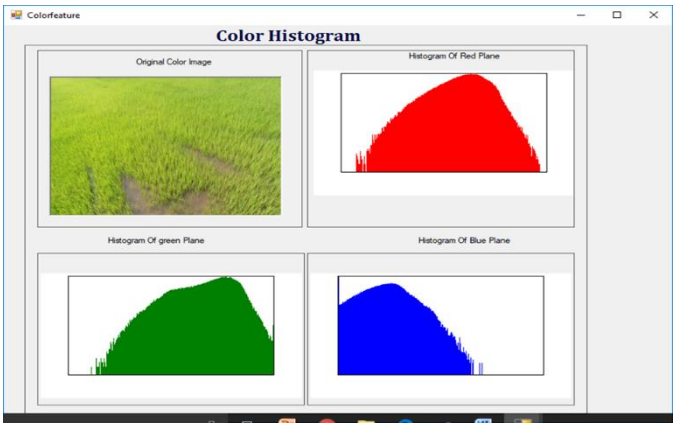
We can perform preprocessing steps to eliminate the noises in images. And then implement gray scale conversion approach to convert the RGB image into Gray values



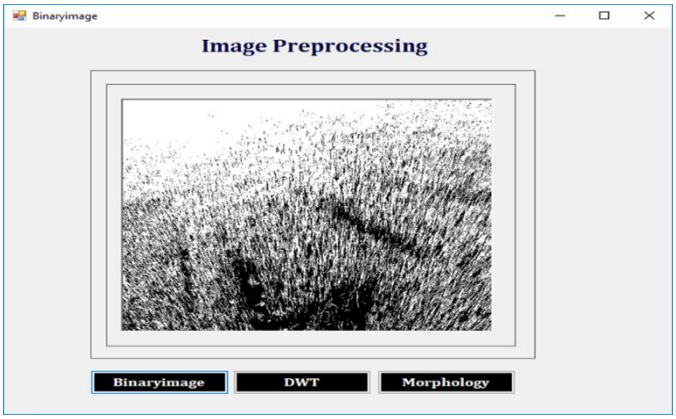
Then implement filtering algorithm to eliminate the noises in images using median filtering algorithm.



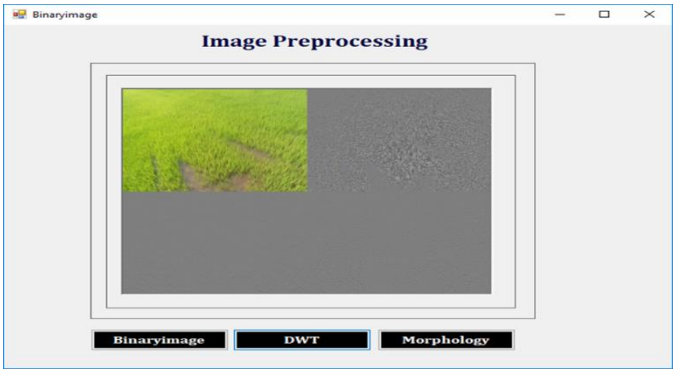
In feature extraction steps, we can calculate the features values which includes x and y values.



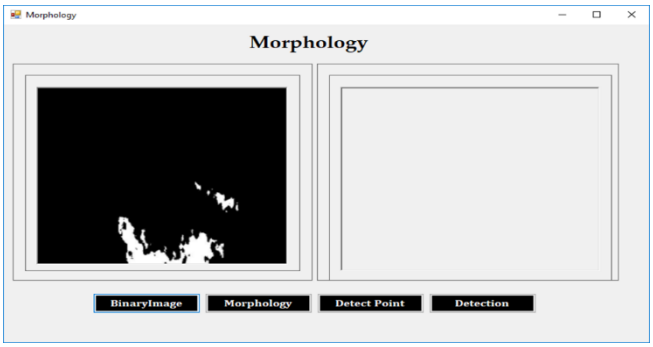
Then calculate the histogram values of images and display the RGB values in graph format



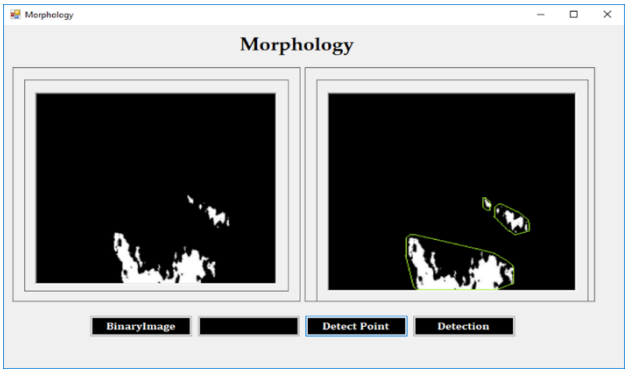
white values and show binary image in home page In this screen, perform binarization steps to calculate the binary values which includes black .



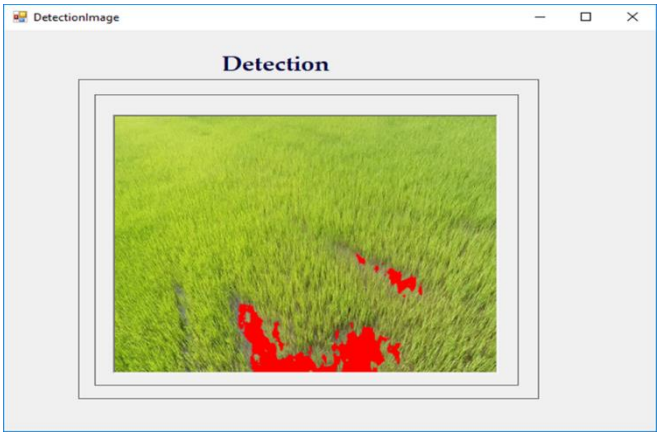
Then perform DWT algorithm to calculate the low frequency pixels and get the direct component values for using further process



The proposed system includes morphology operations such as dilation and erosion. It can be used to analyze the missed pixels



This screenshot show the boundary detection steps to identify the missed files with line drawing specification



Finally provide the failure detection pixels in original images and marked as red pixels

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