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A Survey on Automatic Crops Damage Assessment Using Remote Sensing

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Abstract: - This article consideration a combination of unmanned aerial vehicles (UAVs), machine learning and remote sensing technology as promising technologies to tackle this challenge. The deployment of UAVs as sensor platforms is a rapidly evolving research area for precision biosecurity and agricultural applications. In this experiment, data collection activities were carried out on crops that were severely affected by various factors, such as natural disasters. In this study, we describe the deployment of a drone platform for collecting high-resolution RGB images for orthophoto imaging. An unsupervised machine learning formula was developed to construct a significant divide of the image at each level of the damaged culture. The implementation algorithm is based on a K-means clustering algorithm. The results show that the algorithm provides the accurate data and the field can be consistently divided into subcategories one for crop damaged area etc. The methods present in this document is a place for further research on automatic damage crop assessment. The motivation of the work is to find the accurate damage area of the field using UAV's. So that we will get 100% accurate damage area.

KEYWORDS: **- Unmanned aerial vehicles, Image processing, remote sensing, machine learning, K-means clustering algorithms etc.**

1. Introduction

The growing field of interest in today's world is agriculture. The latest techniques used in agriculture helps to analyses the damage crop areas. Crop assessment diagnosis uses techniques like Machine Learning Algorithms, Image Processing Techniques, and Deep Learning etc. for identification of damage crops. Machine Learning plays a crucial role in this field. The symptoms present on the damage crop area or the crops are processed with the help of image processing. These are the main source for the detection of damage crop area. They can be of various types depending on the stages of the image processing. Machine Learning is a technique in which the system learns automatically using the information provided. Large amount of training data gives good accuracy of the Remote sensing applications in agriculture. Many sensors have been used to detect and accurate calculate areas of crop Damage area by the agricultural environment. Collecting aviation data using drones is one of the fastest growing areas of remote sensing technology. Remote sensing technology for unmanned aerial vehicles provides a cost-effective platform that captures crop damage data in real time to improve farm management. Government agencies and research institutions have paid particular attention to the ongoing development of an existing technologies but recently, crop insurance companies have shown interest in assessing crop damage assessment using Unmanned Aerial vehicles platforms. Remote sensing is an important application area for damage crop assessments. Both unsupervised and supervised segmentation -Algorithms are clearly affected by image quality of a damage crop area. Therefore, segmentation of images is still a very subjective task. K-means Clustering algorithm is a major branch of machine Learning technology that technology that aims to organize the elements of a data set in a cluster so that elements in one cluster are more "similar" to each other than others. The main contribution of our paper is to find out the accurate damage crop area so that farmer will get fully benefits in terms of money provided by the government agencies.

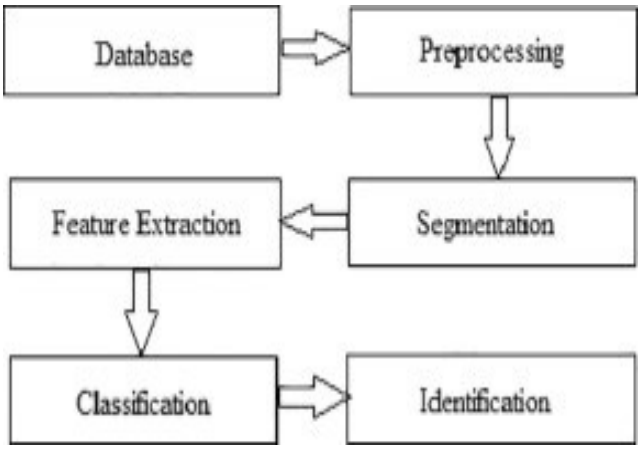


Fig. 1.The overview of Image processing algorithm. This is just a basic Building blocks of Image processing steps of damage crop assessment.

2. Related Work

In recently years, damage crops Assessment using remote sensing technique have received more attention by the Government .There are various technique which has explained by the some selected reviewed paper from 2004-2020. [1]. The title of the first review document is a 2017 remote sensing assessment of grain hail damage. by s.k Singh, rajat saxena, akhilesh porwal, neetu. The Input of this paper was Normalized difference vegetation index (NDVI) deviation image. The purpose of this study was to evaluate the usefulness of satellite imagery in assessing ridge / heavy rainfall due to crop damage. Technique of this paper is differentiate between damaged and unaffected crops. [2].Paper title of second review paper is Assessment of crop damage using space remote-sensing and GIS in 2010 by N.Selleor, K.Perakls, G.Petsanis .input is Digital field (cadastral) maps were used. Objective is Relation between damage crop by field observations and NDVI data. Technique of this paper is supervised classification and Regression models. [3].Paper title of third review paper is supervised classification and Regression models in 2015 by F Gonzalez, Hamilton, E.Puig and P. Grundy. input of this paper is Aerial data collection using lightweight, unmanned aerial vehicles UAV.objective of this paper is organise cluster data elements so that the cluster element are more similar than this other cluster. Technique of this paper is K-means clustering. [4].Paper title of fourth review paper is remote sensing and machine learning for crop water stress determination in various crops in 2020 by Pachghare Patel, Sunil Kumar Jha, Shyamal S. Virnodkar, Vinod K. input of this paper is Remote sensing image. Objective of this review paper is Crop identification, yield prediction with better accuracy than conventional RS methods. Technique of this paper is Infrared thermometry and CWSI-based methods. [5].Paper title of this paper is UAV, K means-Clustering, Orth images etc.in 2004 by E.Puig, F. Gonzalez, G. Hamilton, Grundy. Input of this paper is Satellite image and objective of this paper is High resolution imaginary from a UAV platform Described. Technique of this paper is UAV System, Sensor payload, Flight planning. [6].paper title of this paper is Crop Cultivation, Machine Learning, Deep Learning, K-means clustering in 2008 by R. Poonguzhali ,A.Vijayabhanu.input of this paper is Hail damage simulations and hail damage assessment using remotely sensed imagery. Objective of this paper is to identify the images of Data Like crop Condition. Technique of this paper is Image Acquisition, Collection Data by Image. [7].Paper title of this paper is Image Processing, Nutrient deficiencies, Crop Management In 2004 by Santosh S.Lomte, Janwale Asaram Pandurng. Objective of this paper is Digital image. Objective of this image paper is Capturing Images Through aircraft or Satellite.technique of this review paper is Capturing Images Through aircraft or aircraft or Satellite. Technique of this review paper is Capturing Images Through aircraft or Satellite.

3. Overview

The traditional damage surface culture method is not efficient and it takes a lot of time, high cost and low accuracy. However, this article introduces remote sensing technology for monitoring agriculture. Unmanned aerial vehicles have the advantages of time, speed, convenience, low cost, high accuracy and rich data. Drone remote sensing is so flexible that it is not easy to focus on regional and long-term surveillance of destructive agricultural areas. We are discussing how to quickly process the damage crop images and how to extract harvest information and object-oriented information for image processing. The advantage of unmanned drone sensing is its broad prospect of application in precision agriculture.

1. UAV remote monitoring is widely used in various fields due to its advantages of convenience, high efficiency and low altitude under clouds.
2. Acquisition of high resolution images by UAV with various sensors is an important approach to identify crop growth and identify damage crop for precision agricultural.
3. These UAVs have different sensors, such as RGB, and the images acquired from different sensors usually have different resolutions.
4. During UAV flight, the camera position is constantly changing, and the orthophoto image has different viewing angle.

4. Challenges Envolved

1. The consistency and stability of light source during each photo section and throughout the project.
2. During image processing at various stages, there may be major issues that can be categorized by factors that affect image acquisition, processing and analysis, image preprocessing, and segmentation. These issues can be addressed through appropriate assessment methodologies

5. Limitations of Existing Works

1. This Software are too expensive.
2. They do not provide Flexibility in a normal user.
3. This Software needs lots of memory.

6. Problem Statements

1. We should have a high resolution camera for detect the exact and accurate damage image which we want.
2. We will get the raw images from the camera and perform the image processing on it.

3. We should have the right and proper algorithm on each steps of image analysis like image acquit ion, image segmentation, Image Classification etc.

4. Approx. 100% accuracy should be there during image analysis otherwise there is no use of using this techniques.

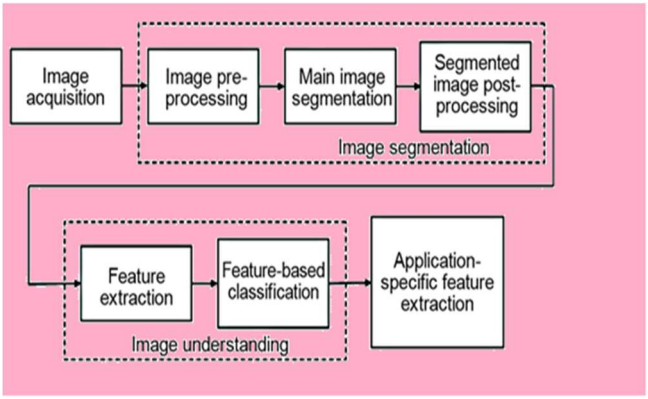


Fig 2. PROPOSED ARCHITECTURE

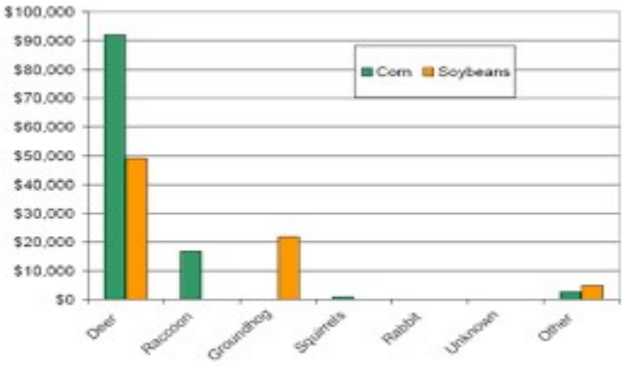
This is overview of image processing algorithms of damage crop assessment

7. Summarized Review of status

This study shows how the UAV platform evolves into an aerial sensor platform that can be deployed efficiently, at low cost, to calculate damage areas and estimate them in real time. A high resolution RGB sensor captures an image of the damaged area. Image processing algorithms have been proposed that transform a single high-resolution single image into a single orthophoto prior to image analysis. A K-means soft clustering algorithm are proposed and implemented. The asset of this method is that it introduces adjacent parameters to control the high frequencies of the components in each image band. Therefore, one parameter needs to be adjusted to adjust the smoothness of the cluster edges in the fault region. The real image or the solution constraints imposed on the real image indicate the exact separation of the clusters. Membership cards are used to measure the damage caused by each level of field culture. The methods described in this document will eventually succeed if the harvest is equally damaged. This method can be used to gather evidence to better understand the area of damage. Crop insect risk is assessed using an unmanned aerial system. An important first step is to assess crop damage using non-invasive sensors, but more steps can be taken to validate the results with a more thorough investigation. In summary, this document shows how UAV-based remote sensing and machine learning technologies play an important role in damage. Further research will comprise the accuracy of using new dataset test algorithms and the study of automatic crop damage assessments using UAV's systems.

8. Comparative literature Based on the Automatic Crop Damage assessment

In this review, we have shown only the main categories of change detection techniques. There are many hybrid techniques that use variations of the unsupported, controlled, object-based techniques. Our review focuses primarily on techniques for identifying damage caused by natural disasters using high-resolution remote sensing images.



GRAPHICAL REPRESENTATION

Soybean and corn crops damage by different animals

9. Conclusion and Future Scope

The most severe natural disasters in the last few years have been the most severe, with one third of crops lost. The combination of data and remote sensing models is an effective way to monitor natural disasters and assess crop loss. Therefore, research needs to be done to improve the suitability and accuracy of the method. The algorithm also needs some improvements to further include remote sensing data and other spatial information to explain the impact of natural disasters. Further investigation is needed into the concept and relationship of simulated damage zones. Based on this idea, we can expect more accurate prediction and estimation of future natural disasters. In our paper, we find out the accurate crop damage area by using K-means clustering algorithm.

Table 1
COMPARATIVE ANALYSIS OF DAMAGE CROP ASSE-SSMENT ON PREVIOUS STUDIES

Paper Title	Authors/Year	Input	Objective	Technique
Assessment of damage hailstorm in wheat crop using remote sensing	S. K. Singh, Rajat Saxena, Akhilesh Porwal, Neetu ,S. S. Ray*/2017	Normalized difference vegetation index (NDVI) deviation image	Assessing hail damage / heavy rainfall of crops by capturing the usefulness of satellite images	differentiate between damaged and unaffected crops
Assessment of crop damage using space remote sensing and GIS	N.Selleor,K.Perakls,G.Petsanis/2010	Digital field(cadastral)maps were used	Relation between damage cropby field observations and NDVI data	Supervised classification and Regression models
Assessmet of crop insect damage using unmanned aerial system	E. Puig a , F. Gonzalez a , G. Hamilton a and P. Grundy b/2015	Aerial data collection using lightweight,unmanned aerial vehicles(UAV)	Organise cluster data elements so that cluster elements are more similar than this other cluster.	K-means clustering
Remote sensing and machine learning for crop water stress determination in various crops	Vinod K. Pachghare,V.C. Patil,Sunil Kumar Jha Shyamal S.Virnodkar /2020	Remote sensing image	Crop identification,yield prediction with better accuracy than conventional RS methods	Infrared thermometry and CWSI-based methods
UAV, K-Clustering , Orth images etc.	E. Puig , F. Gonzalez a, G. Hamilton , Grundy/2004	Satellite image	High resolution imaginary from a UAV platform Described.	UAV System, Sensor payload, Flight planning,
Crop Cultivation, Machine Learning, Deep Learning, K-means Clustering	R. Poonguzhali , A.Vijayabhanu ./2008	Hail damage simulations and hail damage assessment using remotely sensed imagery	To identify the images of Data Like crop Condition.	Image Acquisition, Colletction Data by Image
A survey of image processing techniques for agriculture	Lalit P. Saxena1 and Leisa J. Armstrong2/2014	satellite imagery and geospatial tools	Detecting mature apples in tree Images	Apple detection algorithm
Remote sensing of unmanned aerial vehicles for phenotypic classification of field crops: Current situation and outlook	Guijun yang,chunjiang zaho,yanbo hanug,hao yang,rayuang zhang/2017	UAV-RSPs images	Retrieve models for phenotyping field	Communications technology and GPS positioning technology

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