BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Project Presentation Phase –2

Title:A Field Weed Density Evaluation Method Based on UAV Imaging

Presented By

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Under the guidance of

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Introduction

Weeds are one of the main causes of crop yield reduction and quality decline. Hence a weed density calculating and mapping method in a field is proposed through the following steps,

- UAV will used to capture field images.
- Segmenting crops and weeds from images.
- Weed density of a field will be evaluated.
- Providing optimal path for precision weeding

Literature Survey

SL no	PAPER TITLE	AUTHOR AND PUBLICATION	METHODOLOGY	PRO'S AND CONS
1	Weed Identification using Convolutional Neural Network and Convolutional Neural Network Architectures	Dr. E.Gothai , Dr. P.Natesan ,S .Aishwariya ,T.B.Aarthy ,G.Brijpal Singh Department of Computer Science and Engineering, Kongu Engineering College MAY 16,2020	FOUR CONVOLUTION LAYERED ARCHITECTURE SIX CONVOLUTION LAYERED ARCHITECTURE THIRTEEN CONVOLUTION LAYERED ARCHITECTURE VGG16,ALEXNET,ZFNET	In this paper, identification of weeds with the extending convolution layers and architecture such as VGG-16, ALEXNET and ZFNet was done.
2	Vision-Based Deep Learning Approach for RealTime Detection of Weeds in Organic Farming	Vitali Czymmek, Leif O. Harders, Florian J. Knoll and Stephan Hussmann Faculty of Engineering West Coast University of Applied Sciences Heide, Germany AUG 4,2020	Image acquisition Modified YOLO approach Evaluation metric Weed Detection approach	Deep Learning Approach for High Energy Efficient Real Time Detection of weeds in organic Farming

SL no	PAPER TITLE	AUTHOR AND PUBLICATION	METHODOLOGY	PRO'S AND CONS
3	CNN based Synchronal recognition of Weeds in Farm Crops	Yashaswini Jogi, Preethi N Rao, Raksha, Sharadhi Shetty, Shreekari Department of Computer Science and Engineering Shri Madhwa Vadiraja Institute of Technology and Management, Bantakal Udupi, India MAY 18,2021	Data collection, Image annotation, Image Analysis, Training the model, Translating the output	Live Interaction, Short feedback, Timeline familiarity Inflexible, Uniform learning pace Passive
4	Integration of remote-weed mapping and an autonomous spraying unmanned aerial vehicle for site-specific weed management	Joseph E Hunter, III Travis W Gannon, Robert J Richardson, Fred H Yelverton and Ramon G Leon School of Engineering, Mar del Plata National University Mar del Plata, Argentina OCT 21,2020	Experimental Approach, Natural Weed population study, Data Analysis	Natural Weed Population,Surrogate Weed Population study Herbicide efficacy Paraquat

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5	UAV-Based Crop and Weed Classification for Smart Farming	Philipp Lottes Raghav Khanna Johannes Pfeifer Roland Siegwart Cyrill Stachniss Nacional de México/I.T. de Morelia Morelia, Mexico 2020 IEEE International Autumn Meeting on Agricultural	Multiclass Detection for discrimination of different Weed Species Classification of RGB+NIR or RGB only imagery	For an illustration of EXG of the obtain vegetation mask by thresholding, Objects based versus key point based feature extraction Datasets revaluation metrics Impact of geometric features
6	weedNet: Dense Semantic Weed Classification Using Multispectral Images and MAV for Smart Farming	Inkyu Sa , Zetao Chen , Marija Popovic, Raghav Khanna, Frank Liebisch , Juan Nieto , and Roland SiegwartEngineering Technology, Universiti Malaysia Pahang Pekan 26600, Pahang, Malaysia 2019, IEEE	Dense Semantics Weed classification using multi spectral images and MAV for smart farming	Quantitative results Experimental setup Inference on a Embedded Platform For semantic image segmentation, efficient architectures for inference onboard UAVs have mostly been proposed for specific applications

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7	Real-time Semantic Segmentation of Crop and Weed for Precision Agriculture Robots Leveraging Background Knowledge in CNNs	Andres Milioto Philipp Lottes Cyrill Stachniss IEEE International Conference on Robotics and Automation 2018	Region Proposal Filtering Estimating Uncertanity - Max Variance, Max Entropy Sorghum Dataset	Tunning Hyperparameters for region proposal filtering, Robotics navigation Weak Supervision Limited Production Expensive Production
8	Small unmanned aerial vehicles (micro-UAVs, drones) in plant ecology	Mitchell B. Cruzan, Ben G. Weinstein, Monica R. Grasty, Brendan F. Kohrn, Elizabeth C. Hendrickson, Tina M. Arredondo, and Pamela G. Thompson Johnston DG 26 Mar 2021	Flying a small drone along transects over the areas of interests, Images were used to create a composite image and a digital surface model	Safe Environment Cost saving Technology Easy controllable and deployable, In depth and Detail Data in-place Privacy Safety Spying Easily Hack

SL no	PAPER TITLE	AUTHOR AND PUBLICATION	METHODOLOGY	PRO'S AND CONS
9	Deep Neural Networks and Transfer Learning for Food Crop Identification in UAV Images	Robert Chew ,* , Jay Rineer , Robert Beach , Maggie O'Neil , Noel Ujeneza , Daniel Lapidus , Thomas Miano , Meghan Hegarty-Craver , Jason Polly and Dorota S. Temple 23 Aug 2019	Data Labelling Data Description, Agricultural classification	Future Research , Labelling images is straightforward and less time consuming Study Limitation for instance For photo grammetry software
10	A Field Weed Density Evaluation Method Based on UAV Imaging and Modified U-Net	Kunlin Zou , Xin Chen, Fan Zhang, Hang Zhou and Chunlong Zhang	Process of Weed Density evaluation from UAV images Green plant segmentation methods	Provides a effective combination after 2 methods which successfully calculates Weed Density from UAV images Each block consist of up-sampling layer

Masking Crop

- Effective plant classification system is required to differentiate between the weed and the crop.

- As the classification is plant specific various features like the height of the crop and the arrangement information of the crops can be used.

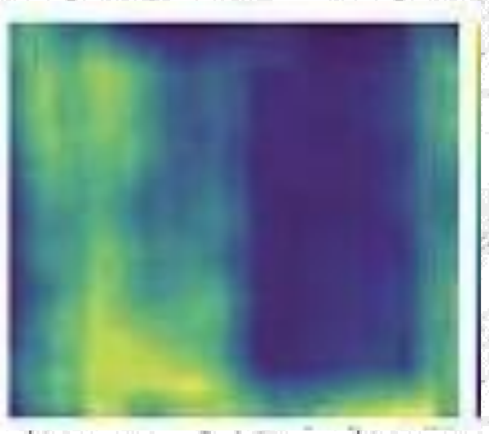
Segmenting Weed

- Green plants and bare land are different in color, so the vegetation indexes can be used as color feature
- Once the crops are removed the excess green index, minus, excess red index can be calculated for each pixel in the image.
- Excess green index, excess red index, combined with the minimum error threshold segmentation method, was used to segment green plants and bare land

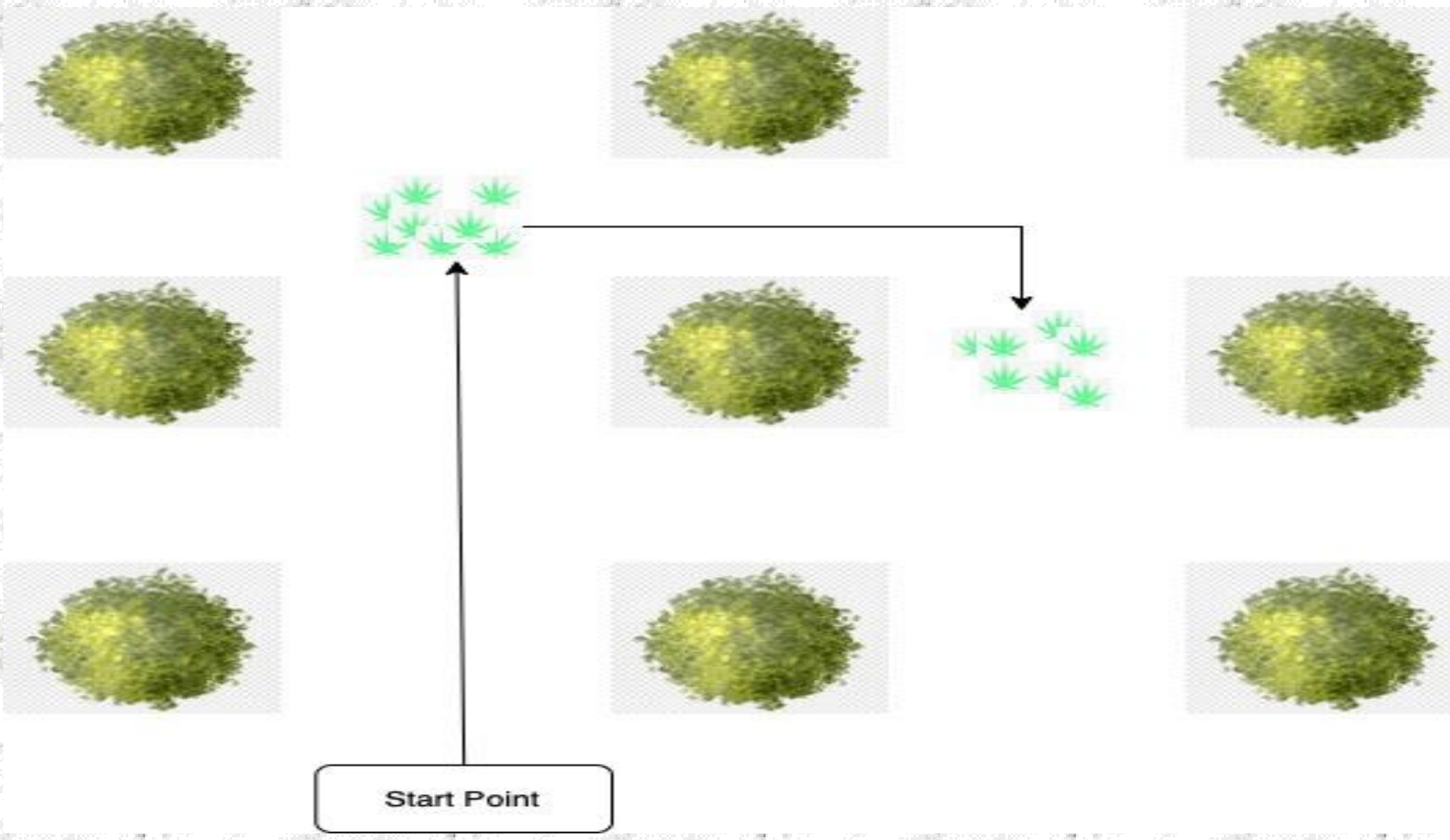
Weed Density Map

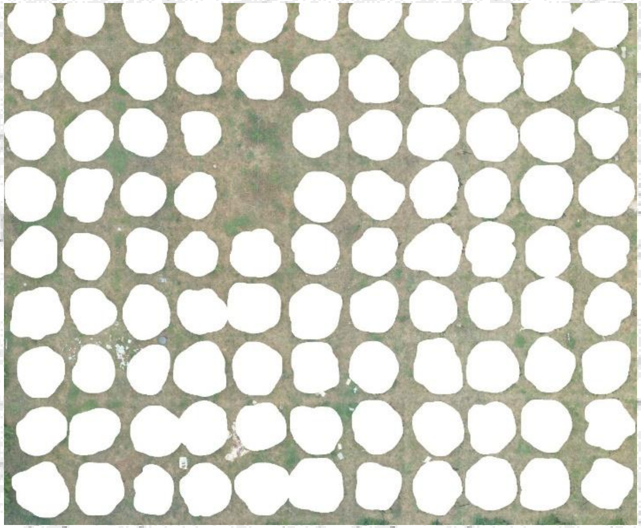
- Clustering can be used to obtain weed area using some threshold.
- The weed density can evaluated by the ratio of weed area to total area on the segmented image.

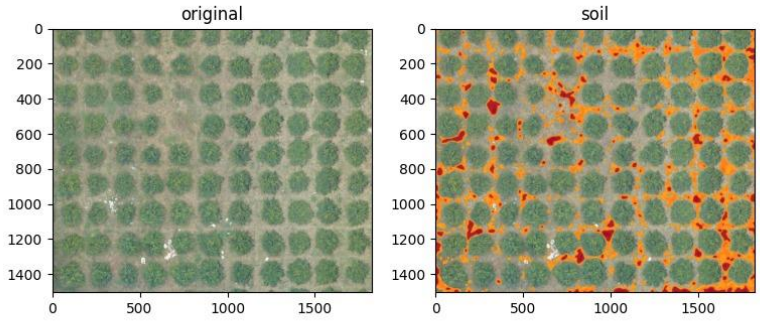
- Weed density heat maps can be obtained by thersholding the image based on the weed density.



Path Planning



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