Detección de malas hierbas a través de técnicas de redes neuronales convolucionales y visión artificial

Andrea Concepción Córdova Cruzatty *, Mauricio Daniel Barreno Barreno † and José Misael Jácome Barrionuevo‡
Department of Energy and Mechanics, University of the Army ESPE
Latacunga - Quijano y Ordoñez and Hermanas Paéz
Email: *accordova@espe.edu.ec, †mdbarreno@espe.edu.ec, ‡jmjacome1@espe.edu.ec

***Abstract*—Today the computation stays i**

I. Introduction

I wish you the best of success.

mds
August 26, 2015

A. Subsection Heading Here

Subsection text here.

1) Subsubsection Heading Here: Subsubsection text here.

II. State of Art

During the last centuries, huge progress has taken place in science and technology developments. Significant milestones such as Communications, Numerical Computer Control and the miniaturization of components have benefited social and industrial sectors on its approach to solve specific problems.

Globalization has permitted countries who are not leader technology developers, like Ecuador, to receive leading edge technological products in order to satisfy requirements and propose solutions to still-unresolved problems.

Industry transformation is a science evolution example; manufacturing, food, and information industries, among others, are signs of this industrial revolution. However there are fields still unexplored in Ecuador like agroindustry. Agriculture in Ecuador has not changed much since precolombine times; while it is true that there are efficient agriculture practices, the lack of technological resources make it impossible for the country to exploit its true potential as an agricultural producer.

Nowadays, one of agriculture challenges is the development of precision agriculture techniques focused on Weed and Crop segmentation. There are studies that show the impact of Weed in corn crops [1]; its yield is affected by 5000 kg/ha. Currently, growing development of Artificial Vision and Machine Learning algorithms allow researchers to propose solutions for Weed Segmentation in Crops.

One of the first approximations to the algorithms of detection of Crops is the developed [2], this could be possible by the use of IR Images, the image is processed by a hysteresis umbral and the method of Min Neighbouring to identify the row of crops. In recent years the implementation of Machine Learning has opened new possibilities for differentiate the Weed from the crops, recently [3] had been developed an algorithm by the use of Harris Corner detector, Feature Detector and using the DBSCAN(Density-based spartial clustering of apllications with noise) as Machine Learning, it demonstrates an effectiveness of 98% in the identification of Weeds in the Rice. [4] Other approximations are the use an optimal method for detection in various types of luminosity, they achived this by the use an ANN for weed and maize classification, with a precision of 92.5%, [5] perform their analysis through the analysis of the green hystogram and performing the segmentation of the crop and weed by classifiers not specified in the document. [6] used the binarization methods of OTSU and Watershed for the segmentation of the images, while the classification was given through a areas analysis to perform a thresholding, although the method is computationally effective when the Weed distribution does not resemble the size to the crop plant, its error increases when there is more density of crop than of weed. [7] propose to use a fuzzy clustering approach to correctly segment the crop green and the same algorithm to classify the soil crop. [8] use a multispectral camera to obtain RGB and NIR images, for the segmentation and classification they use a light CNN for the first process and a Deep CNN for classification, its accuracy is up to 98%. There is an approximation to [9] CNN through the generation of datasets

III. Matherial and Methods

IV. Test

V. Conclusion

The conclusion goes here.

Acknowledgment

The authors would like to thank...

REFERENCES

[1] R. Suárez, J. Piñeiro and J. Valladares *Distintos Sistemas De Escarda En Maíz Forrajero* . Vol II. Gijón , Spain: Publicaciones SERIDA, 2005. Web. 3 Mar. 2017.

[2] R. Brivot and J. A. Marchant, *Segmentation of plants and weeds for a precision crop protection robot using infrared images* Vol 143 Issue 2 Harlow, England: IEE Proceedings - Vision, Image and Signal Processing, 1996.

[3] B. Cheng and E.T. Matson, *A Feature-Based Machine Learning Agent for Automatic Rice and Weed Discrimination* Artificial Intelligence and Soft Computing: 14th International Conference, ICAISC 2015 Part II Zakopane, Poland , 2015.

[4] R. Cheng and J. A. Mason, *Segmentation of plants and weeds for a precision crop protection robot using infrared images* Vol 143 Issue 2 Harlow, England: IEE Proceedings - Vision, Image and Signal Processing, 1996.

[5] D. Abadía, R. Aragués, A. Cirujeda, R. del Hoyo, J. Paniagua, T. Seco, V. Urdanoz, F. Usón and C. Zaragoza , *SAAPIN: Un robot para el desherbado de cultivos y valoración de salinidad del suelo* Vol 143 Issue 2 Harlow, England: IEE Proceedings - Vision, Image and Signal Processing, 206.

[6] R. Cheng and J. A. Mason, *Segmentation of plants and weeds for a precision crop protection robot using infrared images* Vol 143 Issue 2 Harlow, England: IEE Proceedings - Vision, Image and Signal Processing, 1996.

[7] J. Romeo, G. Pajares M. Montalvo, J.M. Guerrero, M. Guijarro, and A. Ribeiro, *Crop Row Detection in Maize fields Inspired on the Human VIsual Perception* Vol 143 Issue 2 Harlow, England: IEE Proceedings - Vision, Image and Signal Processing, 2012.

[8] C. Potena, D. Nardi and A. Pretto *Fast and Accurate Crop and Weed Identification with Summarized Train Sets for Precision Agriculture* Vol 143 Issue 2 Harlow, England: IEE Proceedings - Vision, Image and Signal Processing, 1996.

[9] M. Di Cicco, C. Potena, G. Grisetti and A. Pretto, *Automatic Model Based Dataset Generation for Fast and Accurate Crop and Weeds Detecion* Vol 143 Issue 2 Harlow, England: IEE Proceedings - Vision, Image and Signal Processing, 2017.

[10] H. Kopka and P. W. Daly, *A Guide to LaTeX*, 3rd ed. Harlow, England: Addison-Wesley, 1999.