

Convolutional Neural Network for the Detection of Cocoa Maturity with an Approach for the Analysis of Images Captured at Different Distances

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INTRODUCTION

Incorporating maturity assessment in the cocoa industry with neural networks. This project focuses on developing a convolutional neural network that accurately and efficiently identifies the degree of maturity of cocoa fruits.

Divided into four increments, each addresses specific aspects of detection and classification, capturing images at different distances for a comprehensive approach. Contributing to improving the quality and efficiency of the cocoa harvest, promoting the application.

OBJECTIVES

Develop a neural network with the ability to accurately and efficiently evaluate the maturity of cocoa through images captured at different distances, to improve the quality and efficiency of the harvesting process in the cocoa industry.

METHODOLOGY

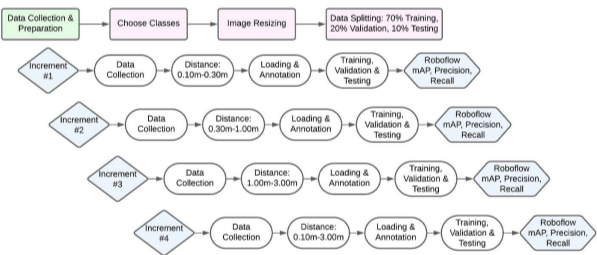


Fig. 2 - Incremental Methodology

CONCLUSIONS

A neural network was developed that made it possible to accurately and efficiently evaluate the maturity of cocoa through 1200 images captured at various distances with a mAP of 92.3%, precision of 91.6% and a Recall of 85.1%.

The comparison of the neural networks trained at different distances was carried out, with a mAP of 91.9% from 0.10m-0.30m, 88.1% from 0.30m-1.00m and 88.0% from 1.00m-3.00m

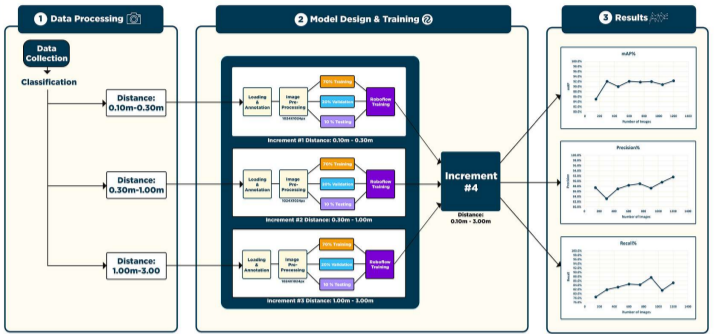


Fig. 1 - Integrative Image

RESULTS

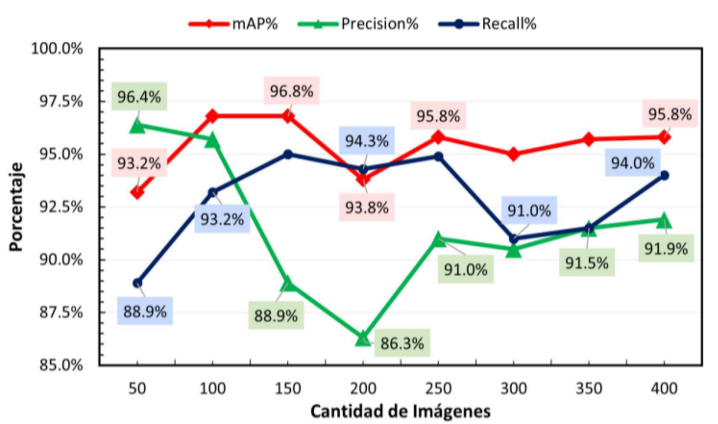


Fig. 4 mAP, Precision Recall of Increment 1.

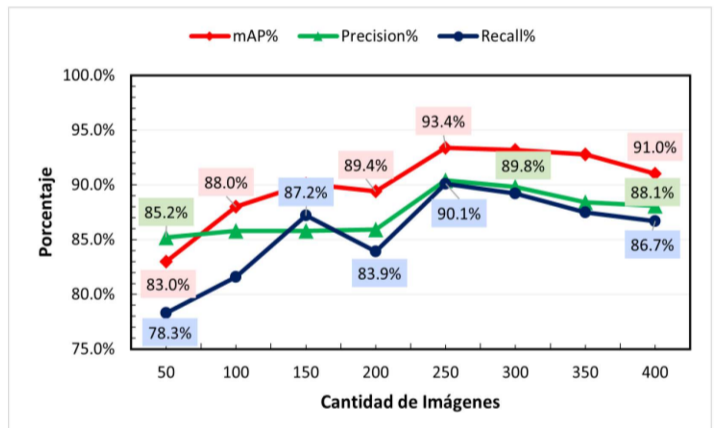


Fig. 5 mAP, Precision Recall of Increment 2.

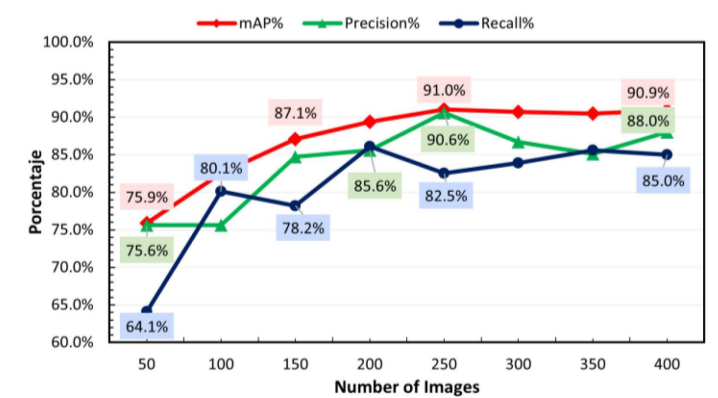


Fig. 6 mAP, Precision Recall of Increment 3.

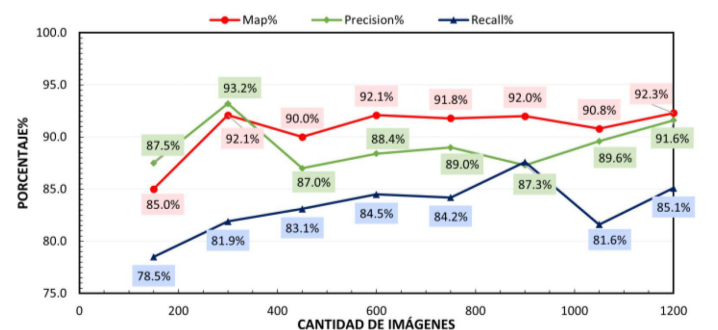


Fig. 7 mAP, Precision Recall of Increment 4.

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