iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** II **Month of publication:** February 2022

DOI: https://doi.org/10.22214/ijraset.2022.40276

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue II Feb 2022- Available at www.ijraset.com

Wine Plant Disease Analysis using Machine Learning

Deepak Kumar
Student of Elektrotechnik und Informationstechnik, Karlsruhe Institute of Technology

Abstract: ***Powdery mildew and other plant illnesses are a big problem in agriculture specially Wine. Every year farmers from all over the world loses many plants and money. Due to the climate change this will enlarge continuously. The fight against these diseases is expensive and time-consuming. In this paper I will talk about especially Wine related diseases like powdery mildew how it can be reduced by using Drone and machine learning as a helpful tool.***
Keywords: Machine learning, Drone, Tensor Flow, Annotation, AZURE, Powdery mildew, CNN (Convolution neural network).

I. INTRODUCTION

Wine is a characteristic, horticultural item. It doesn't result from a decent assembling formula. Hence, it changes over time one year to another contingent upon the attributes of the reap. Each wine, even from a similar maker and from the equivalent terroir, is interesting. Soil, climate, geography, varietals, and wine-production strategies are generally conclusive yet factor factors that give each wine an interesting person and character. The European Association is the world-driving maker of wine [1]. Somewhere in the range of 2014 and 2018, the normal yearly creation was 167 million hectolitres [2].

Grape powdery mildew is brought about by the fungus Uncinula necator. This parasite has a tight host range assaulting just grape plants and a couple of related plant types. It is the most normal and far and wide illness of grapevines. Well known wine grape assortments differ in powerlessness to powdery mildew.

Powdery mildew indications should be visible on foliage, organic product, bloom parts and sticks. Mold for the most part shows up first as whitish or greenish-white fine fixes on the undersides of basal leaves. It might cause mottling or contortion of seriously tainted leaves, as well as leaf twisting and shrinking. Horizontal shoots are truly vulnerable. Contaminated blooms might neglect to set organic product. Berries are generally vulnerable to disease during the initial three to about a month after sprout, yet shoots, petioles and other bunch parts are helpless throughout the season. Contaminated berries might foster a netlike example of reddish brown and may air out and evaporate or never mature. Old contaminations show up as rosy earthy coloured regions on lethargic sticks. Early fine mold diseases can cause decreased berry size and diminished sugar content. Scarring and breaking of berries might be so serious as to make natural product inadmissible for any reason. Winemakers have an exceptionally low capacity to bear fine mold on grapes. Research has shown that contamination levels as low as 3% can pollute the wine and emit flavours [3].



Fig 1: Some variations of powdery Mildew [4][5]

©IJRASET: All Rights are Reserved

We can use drone with a camera to take pictures of the leaves damaged or not damaged and use an AI-network to analyze the pictures for plant to check whether it is damaged/unhealthy or not. The results of the analysis are made available to the user in a heat map using cloud services like Microsoft AZURE. With drone, the AI and the backend can provide a fast and precise solution for farmers and vineyard in the fight against plant illnesses and take timely actions to these extremely dangerous disease of the wine plant

II. SYSTEM SOFTWARE REQUIREMENTS

A. PyCharm

This is a python programming language IDE. It gives wide range of tools for developers. I used this for training and test my Machine learning algorithm.

B. Supervisely

Supervisely is a strong stage for PC vision advancement, where individual specialists and enormous groups can explain and explore different avenues regarding datasets and neural organizations. This is a website I used for annotating my image for training my convolution neutral network. I created 4 classes names “Healthy Leaves”, “Damages Leaves”, “Healthy grapes”, “Unhealthy grapes”.

C. Azure

I used this for processing of collected data and as a storage. This also manage data for users. Due to reasons of scale our Ai network is based on the cloud. The drone of our customer uploads the footage of the vineyard to the cloud where the pictures are processed. This allows us to be flexible and scale our business based on the demand of our customers without expensive investment in our own infrastructure. In the following we show the reasons why we have chosen Azure as our cloud provider.

III. WORKING

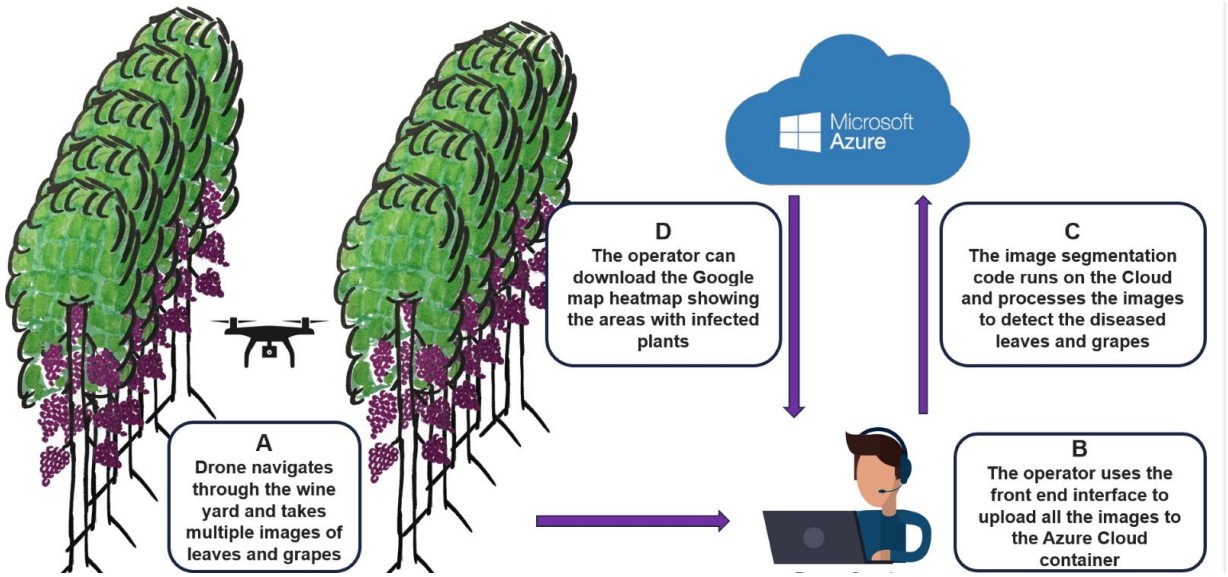


Fig 2: Simple Working of project

Grape downy and grape powdery mildew are two sorts of normal grape illnesses. They could cause genuine harm by means of influencing grape quality and yield. The microbes causing plant infections are troublesome all the time to be recognized by utilizing unaided eye perception technique straightforwardly and sickness manifestations are affected all of the time by different elements. It is hard to analyse plant infections precisely and successfully by utilizing the customary plant sickness determination strategy that is chiefly subject to unaided eye perception. Rather than utilizing unaided eyes, plant infection pictures could be handled utilizing PC vision (AI). This technique could wipe out the picture commotion brought about by ecological factors and picture catch components and could analyse the plant sicknesses consequently. Along these lines, the natural, reasonable, solid and exact data of plant illness determination could be given to the agricultural professionals and the ranchers, and afterward could be utilized to direct establish infectious prevention.

PixelLib in python upholds the execution of occasion division of items in pictures and recordings with Mask R-CNN. It is an adaptable library made to permit simple combination of picture and video division into programming arrangements. [6]
Mask R-CNN is utilized for carrying out occasion division. Mask R-CNN model prepared on coco (a dataset with 80 different object classifications) is utilized to perform occasion division of items in pictures and recordings with PixelLib in five lines of code. PixelLib utilizes move learning with Mask R-CNN model to prepare a custom division model that can be utilized for different applications in taking care of various AI issues, going from clinical, picture altering to vision in self driving vehicles.

PixelLib upholds the two significant sorts of segmentation:

1) Semantic segmentation: Items in a picture with similar pixel values are fragmented with the equivalent colormaps.
2) Instance segmentation: Cases of a similar item are portioned with various shading maps.

Here is an outline of the AI interaction that is utilized to address powdery mildew of Wine:

a) *Stage 1:* Gather and set up the data: When data sources are distinguished, accessible data is accumulated. The sort of data that you have can assist with illuminating which AI algorithm we can utilize. As you survey your data, irregularities are recognized, structure is created, and data integrity issues are settled.
b) *Stage 2:* Training the model: The pre-arranged data is parted into two splits: the preparation set and the test set. The preparation set is an enormous piece of your data that is utilized to train your AI models to the most elevated exactness.
c) *Stage 3:* Validation the model: When you're prepared to choose your data model, the test set is utilized to assess execution and accuracy.
d) *Stage 4:* Decipher the results: Survey the result to track down bits of knowledge, reach determinations, and anticipate results.



Fig 3: Result of CNN on Test image.

Each image consists of a set of pixel values. Image segmentation is the task of classifying images at the pixel level. The machine can divide the image into different segments according to the class assigned to each pixel value in the image, thereby analysing the image more effectively.
Camera takes the picture which is mounted on the drone. Presently, these photos are transferred to the cloud by an individual and in cloud AL algo becomes possibly the most important factor which tells the number of plants/grapes are harmed in the given data sent and creates the Heatmap from the informational index involving the scope and longitude in the picture which is perused by actual individual and this individual can go without anyone else to devoted spot in the heatmap to check the state of yield and make essential moves in like manner.



Fig 4: Heatmap AI algorithm

IV. ADVANTAGES

A. Easily data collection and processing using Microsoft Azure.
B. Easy wine scouting.
C. Drone is used to take pictures therefore that it can go to different terrains and places where traditional machines can't go.
D. Early detection of unhealthy crop.
E. Saves time of farmers.

V. FUTURE SCOPE

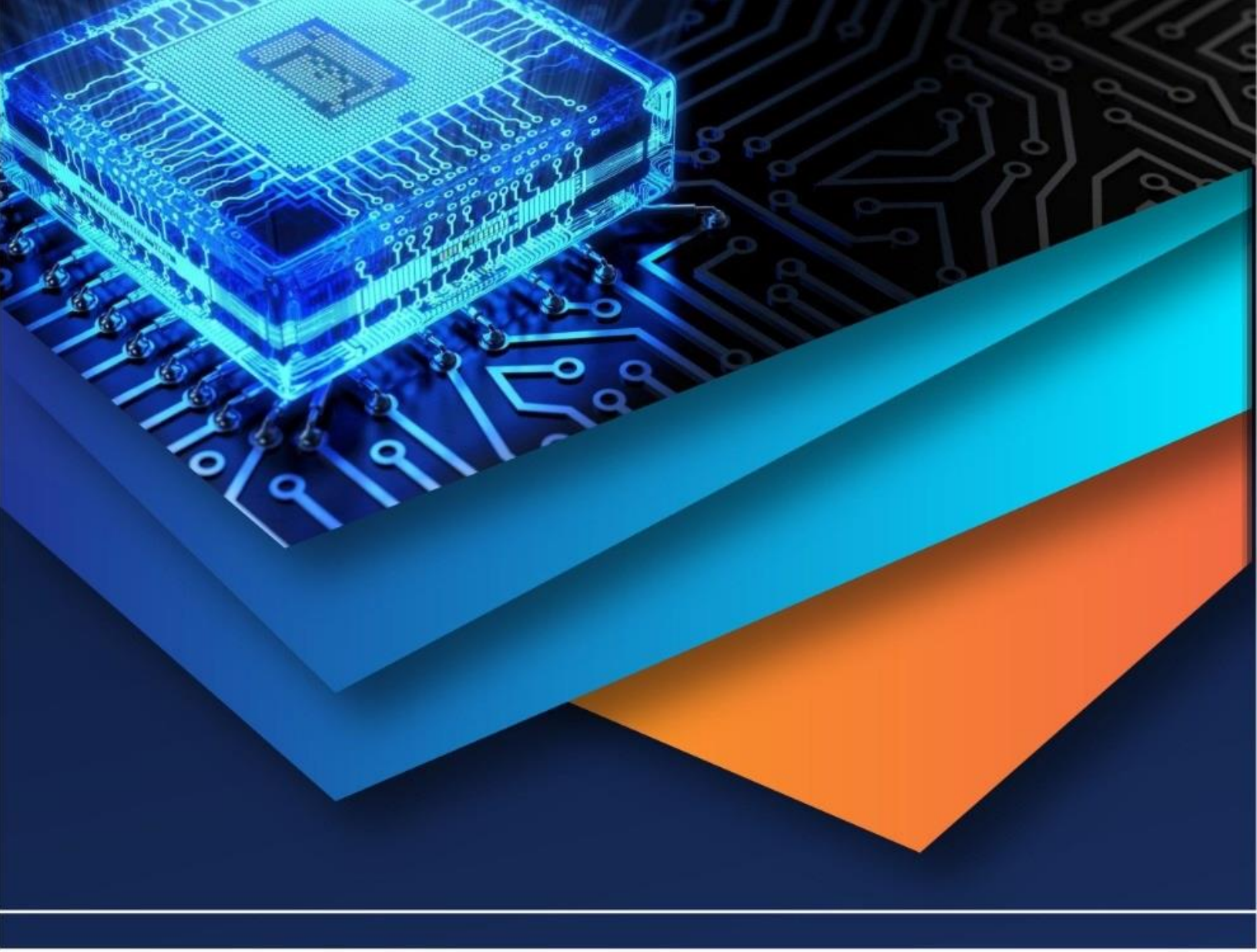
This drone and AI algorithm can be used in future for further applications. One of the use cases which can be possible is adding a pesticide sparing tank to the drone so that whenever AI detects some sort of disease it will inform the dedicated person and can also spray by itself without someone going into the Wine yard or field.

VI. CONCLUSIONS

Now a days most of the farmers are still using traditional methods for analyzing the health of the crop which is very time consuming and takes a lot of time to investigate the diseases mentioned above. Using this drone and AI method it is possible to save time as well as detecting the disease of the Wine in the early stage only which can help a farmer a lot to cure the diseased plants and stop further infections

REFERENCES

[1] https://ec.europa.eu/eurostat/web/products-eurostat-news/-/edn-20201119-2
[2] https://www.ceev.eu/about-the-eu-wine-sector/
[3] https://www.ceev.eu/about-the-eu-wine-sector/
[4] https://www.growingproduce.com/fruits/grapes/powdery-mildew-management-tips-for-vineyards/
[5] https://www.guildsomm.com/public_content/features/articles/b/kelli-white/posts/vine-maladies
[6] https://www.nature.com/articles/s41438-021-00560-9.pdf?proof=t



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)