

Disease Identification and Intimation of Cauli Flower Crop through Tensor Flow and Open CV

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ABSTRACT:

In India 70% of the agriculture field is based on crops only. It might be directly or by indirectly incorporated. So the management of the crops is most important activity. For survival of the crops from many more attacks of diseases, it will take more time to observe by manually. From many more years most of the people tried to do the same thing in different ways that is manual intervention. Each method is having its advantages and disadvantages too. We tried it at most thing has to be done to eliminate the manual intervention by introducing the advanced technologies in to the agriculture field. By using raspberry pi micro-controller and with python we can monitor the crop fields and we get the accurate results with minimal hardware. In this project we are using pi controller and with python software for image processing. In this project we are introducing the cloud storage for storing the data from live feed for the futuristic purpose. All the time we cannot get the past data from the live fields. For understanding the diseases data base and for the analysis we need data has to be mined in the cloud storage. So that we can retrieve the data whenever we need. And for the other future researches also. One more way to collect the data from the files first is we should know the data set types. After knowing what types of dataset, we need, then we should search for the same type of crop but we don't know which place we can get the same crop data set. Even though if we found it owner of the crop fields has to agree to collect the data sets from fields. Because he don't have the knowledge of these all collection he may have fear what if crop may get damaged. So first of all we should clear his fearful thoughts, then only we can get the permission to collect the live feeding of the crop. After that we should keep our hardware setup first in the crop field. After setting up us should start collect the data. Before starting the work we should know clearly about the data sets, how we are going to analysis the data sets, and the storage type of the data. How we are collecting the data and how we are storing the data is important. It may be either local storage, global storage or live feed etc...

Key words: Disease, Crop, Tensor Flow, Open CV

1. INTRODUCTION

Monitoring the crop is a very vital role in management of crop fields for best outcome. Avoiding the manual intervention makes the easiest way for the farmers. Related to technical

terms monitoring wire-line or wireless have many methods. Each method have its own advantages and disadvantages. And in my point of view we should assume first whether we should go for the wire-line or wireless. Before selecting the methods, we should have the ideology for the both the methods and availability of technologies. At present what we are monitoring? Only the crop or along with the crop the field data also we are going to monitor? Once the target is finalized means we can start with the requirements as per the guidelines. As we referred more number of research papers reviews and study papers we came to know that according to the time technology is changing and we are updating with the time lapse, but how we are utilizing the technology is most important. If we seek about only monitoring the crop means we can consider for crop field only wear overlooking the field data. So, point out to the monitoring of the crop means we can have more methods for that. Manual intervention is the oldest way. Up to now the step is introducing the camera with storage capacity. let us talk the disadvantages we should have the camera unit means price increases if maintenance is included, and computer is also included. so here we should talk about the area. How much area is under surveillance and how much area is left behind the camera. How can we make up to remove the area behind the camera? Making more number of camera units and what made us to make mobile unit for camera is a simple ramp unit for moving the camera from covering the most of the area. So, if we make the greater number of camera units we can have the total areas under surveillance. According to the time lapse we are updating the hardware units and software in project. Our project will come into the area of image processing for this working module we can use the software mat lab,java , python etc. we can feed the data to the software's in terms of images and video. Feeding also having 2 parts live-feeding from camera or from predefined storage for analyses purpose and future scope. So the software's can analyse the data with predefined diseased data sets. Now we are using the hardware for this project is raspberry pi. And software for image processing is python, after referring more number of research papers for image processing related to crop monitoring we are developing a new algorithm for disease identification.[14]In this project we are introducing IoT also for monitoring crop from remote locations. Remote location means can see the live feed cast from cell phones and computers and we can control the motor setup from IoT and in this we are introducing the cloud storage for data storing so that we can retrieve the data at any time. Because we have any problem

while monitoring the crop field it may be a hardware problem or software problem or anything. We should keep our recorded data safe so we introduced the cloud storage.

This paper substantiates the look at of diverse strategies for leaf ailment detection. There is critical attributes of situation discovery are pace and moreover precision. Therefore, there's working on improvement of computerized, inexperienced, fast and additionally particular that's utilization for detection circumstance on dangerous leaf. Work may be extended for improvement of crossbreed formulas & neural networks so you can raise the acknowledgment charge of remaining class technique. Better to had to compute quantity of state of affairs present on leaf [1] In the unique software desires of soil environmental tracking tool in addition to evaluation those hassle current in monitoring device, we created and implemented a cordless sensor network based totally at the soil temperature degree moisture tracking tool. The system can understand swiftly automatic networking and additionally real-time data purchase, transmission, show. With the developments of less pricey, low energy utilization, adaptability networking, without cabling, high-quality interface, etc. With GPRS generation and Web Solutions generation, we can understand the characteristic of the data networking, a long way off tracking, it exhibits that the device can satisfy the requirements of the temperature further to moisture of dirt environmental tracking and moreover mixed control. In destiny, we will screen the floor water level utilizing ideal sensor. Better the research also can be improved to generate a device that may check the whole weather situation for a large region like nation or usa of the us [2] Web of issue has numerous of applications and moreover proper here we had really used within the location of fireplace safety and additionally surveillance. Particularly in AC buses. IOT has a extensive software history within the field of actual time applications by and large in protection and protection structures. This proposed device generally concentrates on minimizing the human loss and additionally building loss even as mishap had taken place. In our endorsed system the safety nets are applied right away, So the time to apply them can be very less, so the loss may be minimized. We suggest this machine as a preliminary strive and moreover praise to mass transits. Lots of crashes takes region in some unspecified time in the future of night time time, in addition to sometimes when chauffeur is in sleepy trouble motive force cannot regulate the bus, if there may be a sleepiness discovery then in that events an alert is obtainable to vehicle riding force inside the shape of buzzer. [3] This paper counselled a greater framework of convolutional neural networks for the identity and class of a huge dataset of various plant leaf ailments. Based upon the normal 5-layer convolutional model of VGG16, the final, clearly linked layer of VGG16 turned into changed with Inception as well as SE additives [4,14,15] This write-up provided a diffusion help group related to the guidance in addition to manipulate of surroundings troubles in greenhouse vegetation. It has clearly revealed the usefulness of preference aid structures in supplementing computerized manipulate systems for tremendous expertise obligations in which the variables decisively effect crop development. The installed tool facilitates cultivators in selection-making, providing greater

2. LITERATURE SURVEY

real-time statistics to the weather manipulate systems collectively with a selection of treatments to issues that get up in the computerized surveillance of environment conditions throughout the growing period. [5] Rapid, automatic, picture-primarily based crop circumstance popularity plays an critical obligation in crop contamination management. Because of the abnormality, complexity, and sort of diseased cucumber leaves, masses of present classifiers cannot meet the goals of an automated cucumber circumstance acknowledgment gadget. Using SR, a newly superior however broadly used facts illustration design; we propose an particular crop disorder popularity approach primarily based totally upon cucumber leaves. The encouraged approach makes use of blended form and color capabilities from infected leaf photographs in schooling to create a dictionary, after which acquires an approximate SR of the input leaf pix by way of way of a sparse layout solver mind-set [9] From the consequences it could be ended that dithered & HSV photos can be more fast eliminated than RGB and additionally YIQ snap shots while GLCM computations are used in addition to HSV images can be fast removed than RGB, YIQ and Dithered pics at the same time as the use of Wavelet decomposition method. Via GLCM, Straightforward RGB as well as Dithered pictures may be extracted at the concept of contrast, courting, homogeneity in addition to energy; while HSV pix may be eliminated at the bases of entropy and suggest, and also YIQ images may be without trouble extracted at the concept of correlation carbon monoxide- dependable.[15] Through Wavelet disintegration, HSV photographs are extracted on the idea of advocate, stylish deviation, without delay and moreover vertical detail; at the same time as RGB photographs are drawn out on the basis of vertical detail, YIQ pix are eliminated on the basis of hetero and additionally vertical element and Dithered pictures are extracted on the idea of widespread deviation and horizontal thing [10] The advocated CNN based leaves infection identity layout can classifying four several deficiencies in leaves from the healthy and balanced one. Since CNN does not name for any form of tiresome pre-processing of input photos and additionally hand evolved features, faster convergence price in addition to wonderful training general performance, it's far desired for several packages as opposed to the conventional algorithms. The kind precision may be better more suitable via the use of imparting greater images within the dataset and moreover tuning the standards of the CNN model [11,16,17] In this paper utility of appearance stats for detecting the plant leaf sickness has been explained Firstly with the resource of colour transformation framework RGB is converted into HSV room due to the reality that HSV is a wonderful shade descriptor. Masking and putting off environment-exceptional pixels with pre-computed threshold diploma. Then in the following step department is done using 32X32 spot length and received useful segments. These sections are utilized for structure assessment by means of the use of colour co-occurrence matrix. Finally, if shape specs are contrasted to form specs of typical leaf. The extension of this activity will consciousness on developing algorithms as well as NN's a good manner to enhance the

recognition fee of category process [12,18,19] In this studies observe a photo processing based strategy is suggested and moreover carried out for leaf ailment detection. We examination our software program on 5 situations which result at the vegetation. They are: Very early scorch. Cotton mildew, diminished mould and mould, overdue scorch, tiny whiteness. The recommended method is image-processing based totally and additionally will be very based totally on K-Means clustering technique in addition to ANN. This approach includes four primary stages: after pre-processing phase, the photos available are segmented using K suggests strategies after that a few shape functions are removed in which they may be lengthy beyond via a pre licensed neural community [13,20,21] In this studies look at, a plant situation based totally definitely leaf popularity method changed into brought on this paper. The suggested formula ends up universities on five sort of maize infection. The experimental effects endorse the proposed approach can apprehend and end up privy to the plant situations with excessive acknowledgment fee [14,22,23].

3.PROJECT BLOCK DIAGRAM AND DESCRIPTION

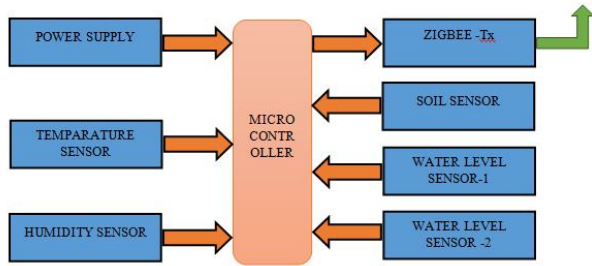


Figure1 :DATA Tx BLOCK

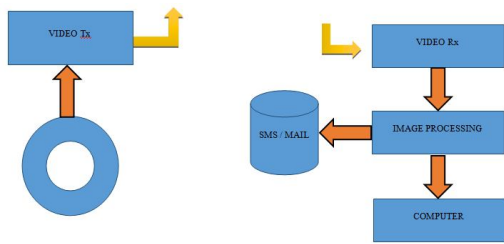


Figure 2 : VIDEO Tx BLOCK VIDEO Rx BLOCK

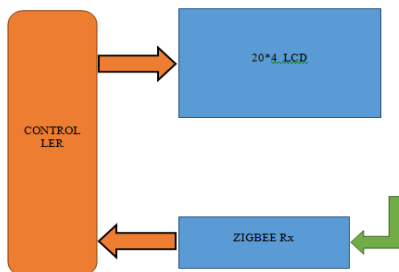


Figure 3: DATA Rx BLOCK

Mainly this project deals with wireless monitoring of cropsfield. And intimation will be done to the farmer in case any dieses found in the crops.

Mainly this project contains 2 cameras

1st camera is isolated camera which will record the crops daily for some duration after that we will add those video clips so that we can identify the growth of the crops. This camera has internal storage so that we can store the video their itself. Otherwise we should keep 1 system for video recording.

2nd camera is to record the crops and send to the system to cross check the received video with the database frames means the diseases in case the video clips matches with the database frames then automatically the intimation will be sent to the farmer with the type of diseases.

3.1 This project contains

- **DATA T_X block, DATA R_Xblock, VIDEO T_Xblock** as shown in Fig 1.
- **VIDEO R_X block** as shown in Fig 2.

3.2 The DATA T_X block contains

- Microcontroller, Power supply, Temperature sensor, Humidity sensor, ZigBeeTX ,Soil sensor , Water level sensor 1,Water level sensor 2 as shown in Fig 3.

3.3 The DATA R_X block contains

- Microcontroller, 20*4 LCD, ZigBee RX

The Video T_X block contains

- Wireless camera

The **Video R_X** contains system with image processing software.

In case any disease found in crops which is analyzed by the matlab software will be intimated to the farmer by means of GSM Modem with diseases type.

In DATA T_Xblock

- temperature sensor reading, Humidity sensor reading, Soil sensor reading, Water level sensor 1
- Water level sensor 2.

All sensor readings are captured by the microcontroller and all the data will be transmitted through the **ZigBee T_X** module to the **ZigBee R_X** module. Video will be transmitted through **Video T_X** wireless or by wireline to the **Video R_X**.

- In **video T_X** block video will be transmitted to the system.
- In **video R_X** block video will be received at system.
- In **Data T_X** block all sensor readings will be transmitted to the **Zig Bee R_X**.
- In **Data R_X** block all the sensors readings are received by the **Zig Bee R_X** and it will be displayed at 20*4 LCD.

4.OVERVIEW

In this project we are using raspberry pi micro-controller for the entire process and we all know that raspberry pi has inbuilt IoT so that we can monitor the crop from remote locations. If we are talking about the software we are using python for the software process and execution of image processing and getting the results and for the intimation processes we are using the GSM module for sending the SMS to the farmer for intimating about the crop diseases. And, we are sending the emails to the former to alert, these days all having the smart phones in

handy. So, we can proceed with these intimation techniques. Once the setup has been completed at the field, we can retrieve the data from the camera to the IoT module the python will start analysing the data received with the predefined diseased data sets. Once if we come through the diseases attack with the crop easily, we can catch the diseased one. Means once the diseased data matches with the data, alert will be sent to the farmer along with the SMS and EMAIL as shown in fig 4 and fig 5.

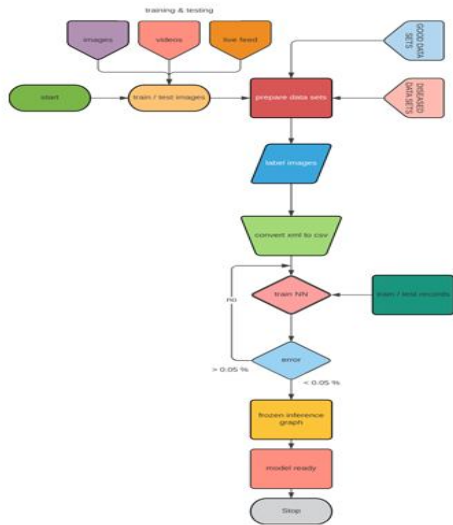


Figure 4: Flow chart of Training and Testing

5.COMPARISONS

This paper is made comparatively with more research papers. Comparison to the hardware, software, and algorithms. If we talk about existing methods, we have more methods for monitoring the crop fields. if we take only one method into consideration, we can upgrade the hardware software and algorithms along with the same method. So what we did is we made all assumptions and made a generalization on existing methods and we are proposing the new method to the same task. This method includes hardware software and algorithms also. Like up gradation in micro-controllers from 8051, ARDUINO, AVR, PIC to raspberry pi and changing the image processing software from java to python and more accuracy in algorithms. Extensively we have given the comparisons in literature survey. Changing in all terms means we can get the best product output, accuracy and also in time we can get.

6.IMPLEMENATION

The main step in this project is to setup the camera unit at the crop in the field. Once the unit is fitted, we can start monitoring from remote locations. Before that, the raspberry pi controller unit is loaded with python and image processing tools. Once it is completed means we can use the user interface to start the monitoring. The application which is designed to monitor the crop is already predefined to the databases it may be a predefined data path or a live feed which is parallel with the cloud serveronce the data is getting started by receiving and once the comparisons are

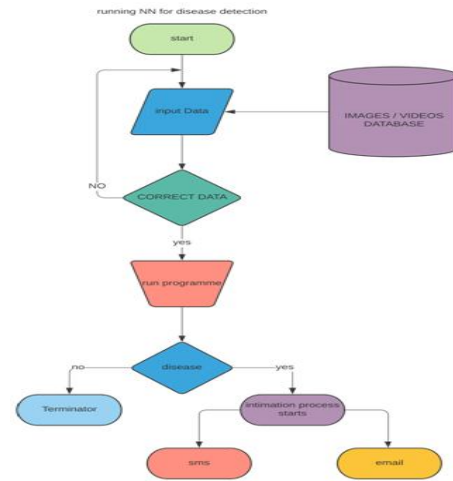


Figure 5: Running NN for Disease Detection

over, the next step is to delete the data because there is no need of storing it unnecessarily at local storage because we are already storing it on the cloud. Whenever we need it, we can retrieve. If we are using as local device, we should again monitor the storage volume as it may get full with the received data. As we are using the global device no need of monitoring as we are getting live feed as shown in fig 6 and 7.



Figure 6: the live setup of stand, control switches & solar panel.



Figure 7: Settingup the camera unit at the crop in the cauliflower field

All the data files and videos can be get on line through this link for future expansion

https://drive.google.com/file/d/1a6aYMnI8BRdhCsG-bmx9aD_0qB8JFDMU/view?usp=sharing

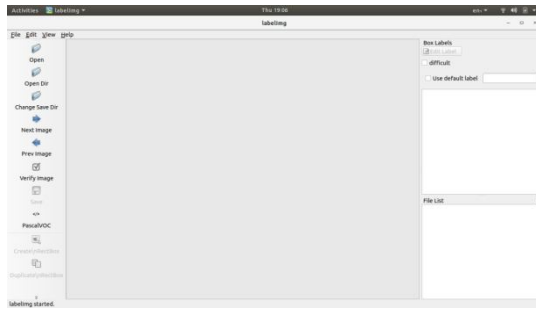


Figure 8: Shows the input screen for labeling the images



Figure 9: Shows the screen of labeling the sectors

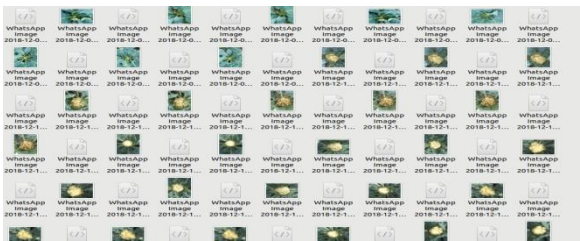


Figure 10: Creation of XML Files

6.1 Existing method Advantages

Minimal cost of the project. We should have the technologies for this application. Planning will add more confidence for completion of the project step by step. More awareness will come while searching for the particular types of application in terms of hardware and software's. At the same time we can know the limitation of the technologies so that we can proceed to next. More number of chances for the upgradation with minimum number of applications. Less complexional. We can complete the project in less time.

6.2 Existing method Disadvantages

Lack of technologies for monitoring from remote locations. Having more limitations. Limited to the crop and fields only. Wire lined methods have more complications compared to wireless methods. So manual intervention is not removed by means of half of the project. Storage facility is not there. We can't transfer the data. Limited to basic terms of monitoring.

6.3 Proposed method Advantages

More portable so that we can place anywhere. We can monitor from remote location. Have latest technology in terms of hardware and software so that we can add more features in future. We can get the accurate results with real time data so that we can take the right decisions. Introducing the cloud. Introducing the IoT. Almost total removal of manual intervention as shown in Fig 8,9&10.

6.4 Proposed method Disadvantages

If we have more area means we should add more number of camera units. Complexity is added in project. Regular maintenance is needed for hardware. We should purchase the software's become more costly for the project. We need technologist for up gradation and for the regular maintenance. What if rain falls. Possibility for theft of camera units. Taking the cloud per year means extra money. We should use the internet of drones for the future generations for elimination of a greater number of camera units.

In this paper we are going to introduce the new algorithm is called "TFMDD" this algorithm has been tested among those algorithms related to image processing it may be a different platform but concept is same for the image processing so finally we get the best results with this algorithm so we are moving forward with this algorithm for better results. If we speak deeply about methodology for making the system work, we can start with getting upto date with raspberry pi-4 which is having specifications like below. The Raspberry Pi four is the contemporary item inside the Raspberry Pi array, flaunting an up to date sixty four-bit quad centre processor walking at 1.4GHz with included steel warmth-sink, USB 3 ports, twin-band 2.4GHz similarly to 5GHz cordless LAN, faster (300 mbps) Ethernet, and additionally PoE functionality the usage of a separate PoE HAT. Next we will follow up with the installation of tensor-flow & open cv and finally protobuff. After installation of these software's we should setup each software's as per our requirements like setting up the directory for the images folders which is having the good and diseased pictures and videos differently. Once it is completed means we can start to setup the tensor-flow software setup, like setting up the directories for gathering the pictures and labelling the pictures. Once this procedure completes means we can start the label mapping and configuration of the training sets. Once the training completes means we can run the trained sets this may occurs mostly on GPU next we can export the inference graph. After getting the inference graph we can start testing the data sets. Actually tensor-flow have more applications like text-based applications, voice/sound recognition, image processing, video detection & time series application developments. In this project we are using tensor-flow for image processing applications. The critical software tool of deep gaining knowledge of is Tensor-Flow. It is an open useful resource synthetic intelligence collection, the usage of facts drift graphs to growth designs. It permits programmers to create big-scale

neural networks with numerous layers. Tensor-Flow is specifically used for: Category, Understanding, Understanding, Uncovering, and Forecast in addition to Production.

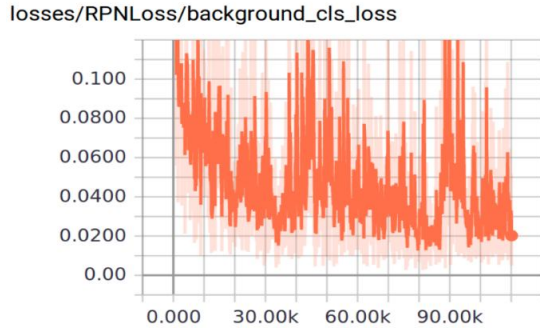


Figure 11: background_cls_loss

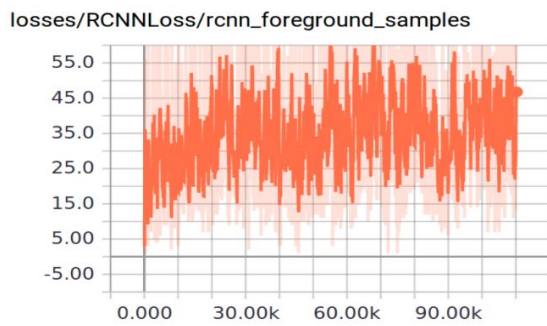


Figure 12: RCNN_Foreground_samples



Figure 13: shows video capture and analysis using Open Source Computer Vision

Protocol Buffers (Proto aficionado) is an technique of serializing dependent facts. ... Information structures (known as messages) and additionally solutions are defined in a proto that means document (. Proto) in addition to compiled with protoc. This series generates code that can be invoked thru a sender or recipient of those records frameworks.

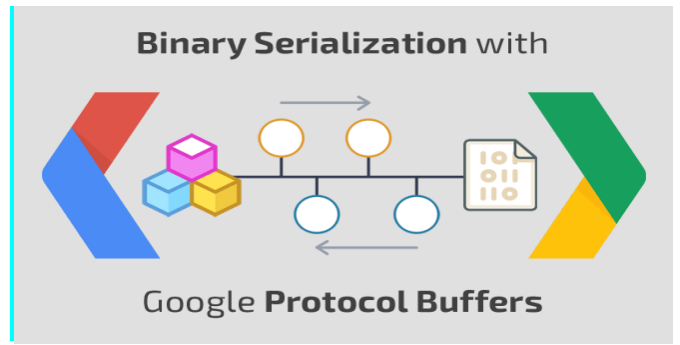


Figure 14: Binary Serialization

Protocol buffers, commonly referred as Protobuf, is a technique installed by way of Google to allow serialization and additionally deserialization of prepared statistics. Google created it with the goal to provide a higher technique, as compared to XML, to make structures have interaction.

Once the disease identified next we should send the sms and email to the farmer with identified disease name. In this project we are using the email client <https://app.sendinblue.com/account/login> for sending the bulk smsas shown in fig 11-20.

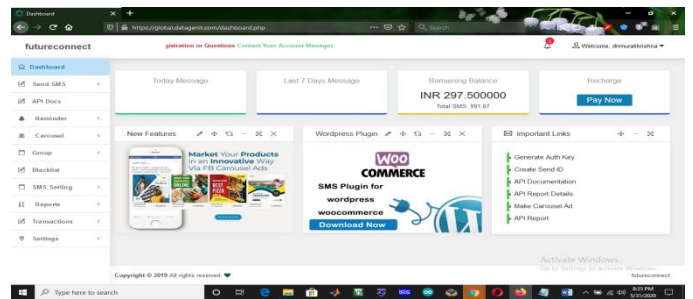


Figure 15: shows screens shot of Sending bulk SMS to all farmers who needs intimation

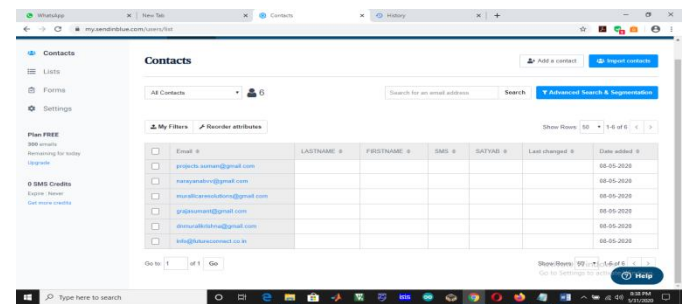


Figure 16: shows screens shot of Sending bulk e-mails to all farmers who needs intimation

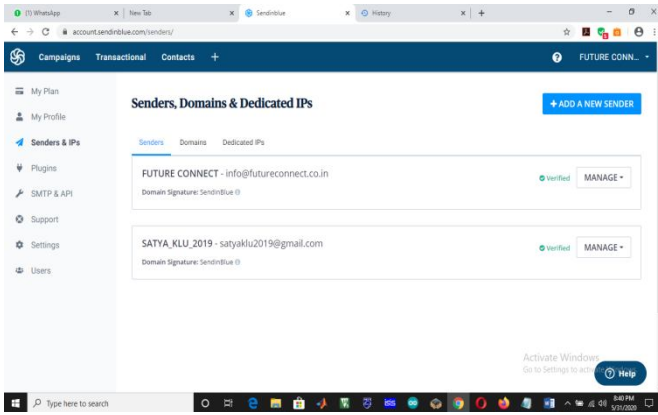


Figure 17: shows screens shot of senders & recipient acknowledgement

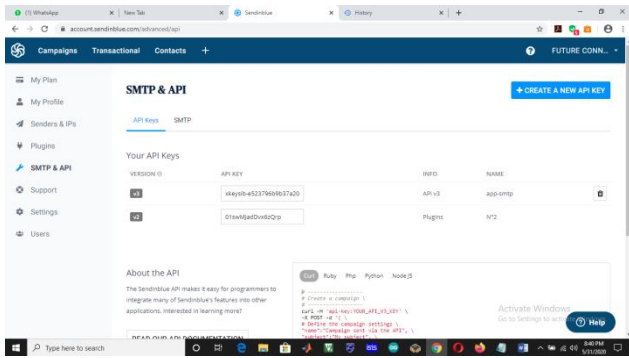


Figure 18: shows screens shot of API keys

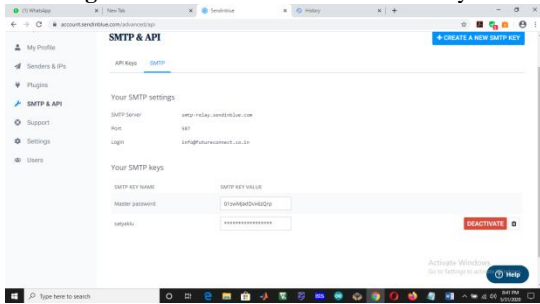


Figure 19: shows screens shot of SMTP settings

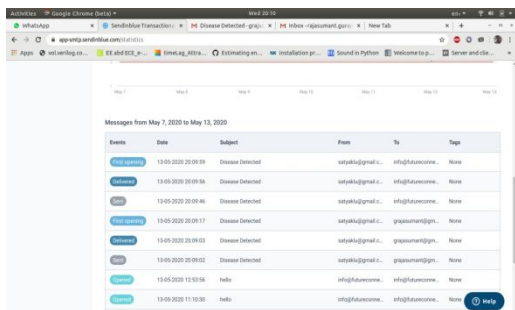


Figure 20: shows screens shot of statistics

7. RESULTS

These are the sms results we got in the cell phone and mails as shown in fig 21, 22 and 23.



Figure 21: SMS Received on Mobile



Figure 22: These are the mail results we got in the mailbox



Figure 23: Mail in Box

8. CONCLUSION AND FUTURE WORK:

We made it up to the mark what we thought in the starting of this project we achieved it. Implementing the technologies what we select to use it we did it. We got accurate results as we wish to get it. We took the diseased data sets from the availability of search. What we thought of to get the greater number of diseased data sets for the identification of new diseases which can skip with the existing diseased data sets. And elated to the future work among this work we can proceed to the future work expansion of total project to the new heights. Means we can reduce the camera devices by replacing the internet of drones for scanning the crops, and we can introduce the GEOTAGGING to the crops which area is GEOTAGGED so that we can easily identify the diseased areas. And by adding GPS routines to the internet of drones we can mark as well to mark the area of soil to be tested, so that we can send the soil for testing if we are getting the same diseases from the same soil. So by introducing the same GEO MAPPING,

GEOTAGGING, INTERNET OF DRONES WITH GPS in the future work we can get the most outcome form the work is to be carried out.

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