



Problem Statement

To help out farmers in crop disease recognition and also consult them up with effective remedies.

The Problem

India drains upto 50,000 crore worth of crops every year!!!

Inability of our farmers to recognize crop disease and take effective measures before the damage

Leads to increasing poverty rates, starvation, suicides,etc.

The Solution

A technology which:-

Can detect crop diseases timely and also helps out with remedies to avoid them.

02

Is portable , user friendly and also supports regional languages.

01

Has expert support for discussion and consultation.

03

Stores database and can do the predictions beforehand to alert the farmers in the future

04

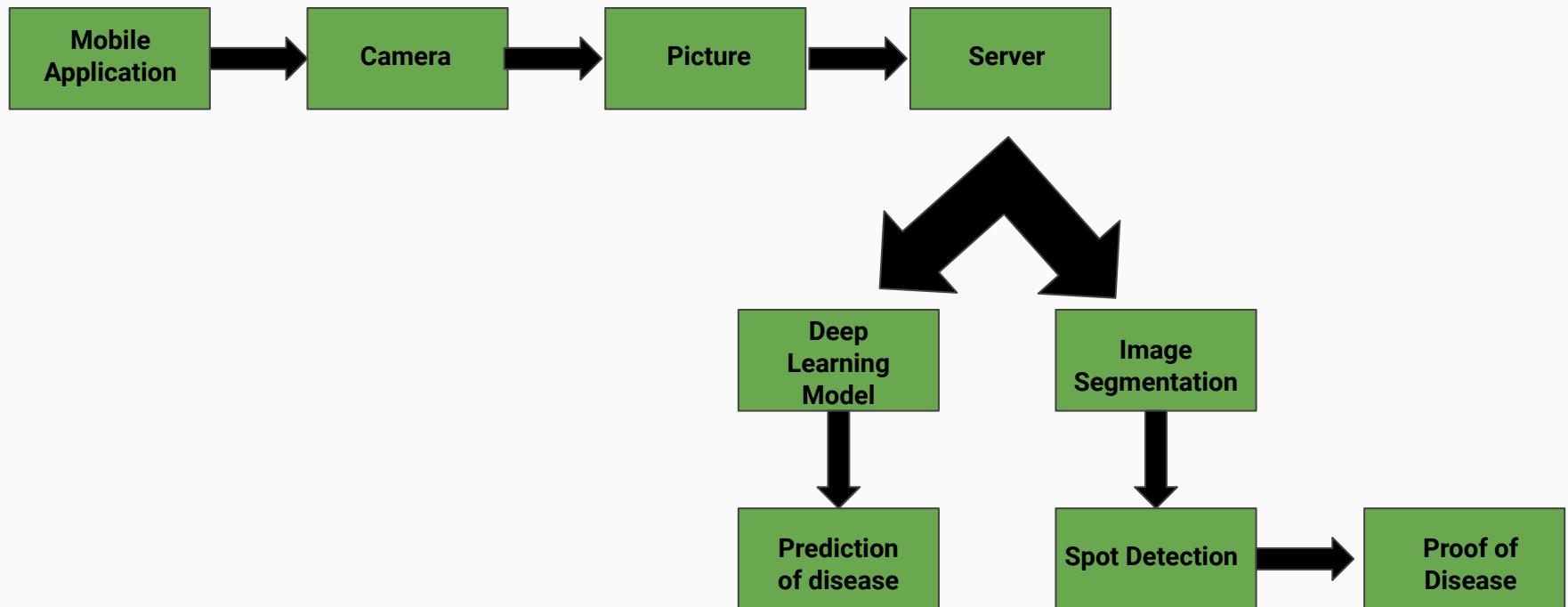


OUR APPROACH

Developing a mobile application which:-

- Has camera functionality to click pictures
- Leaf disease detection using clicked pictures using an accurate model(deep learning).
- Details of the diseases and reliable remedies.
- Choice to consult an expert
- A public forum for farmers for discussion

Working



Background Removal



Segmentation of spots

```
hsv = cv2.cvtColor(img, cv2.COLOR_BGR2HSV)

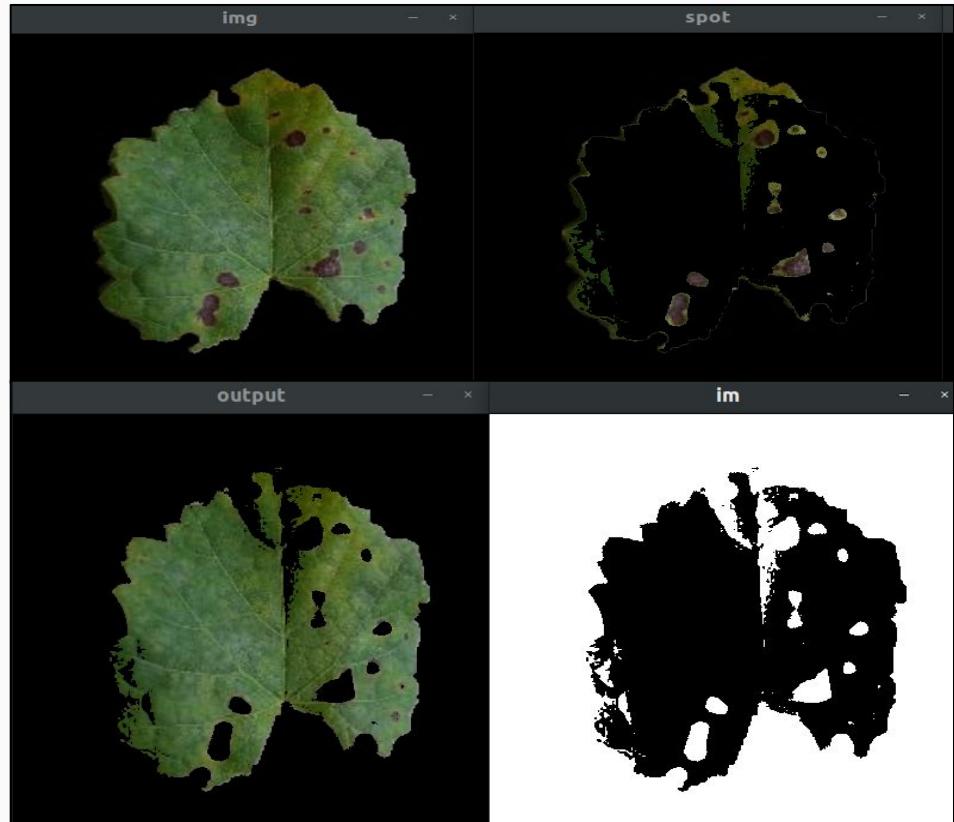
low_green = np.array([35, 0, 65])
high_green = np.array([70, 255, 200])
```

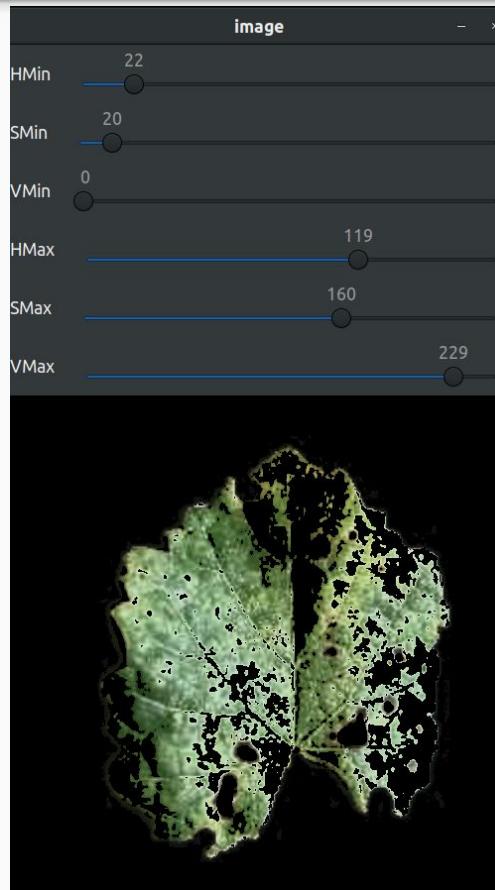
```
# slice the green
imask = mask > 0
green = np.zeros_like(img, np.uint8)
green[imask] = img[imask]

imask = mask == 0
spots = np.zeros_like(img, np.uint8)
spots[imask] = img[imask]

im = cv2.cvtColor(output, cv2.COLOR_BGR2GRAY)

ret, th1 = cv2.threshold(im, 10, 255, cv2.THRESH_BINARY_INV)
```





A white, metallic robotic head is shown in profile, facing left. The interior of the head is visible, featuring a complex arrangement of glowing, circular, and multi-layered components resembling a neural network or a mechanical eye. Floating around the head are numerous small, semi-transparent letters of the English alphabet (A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z) against a dark blue background.

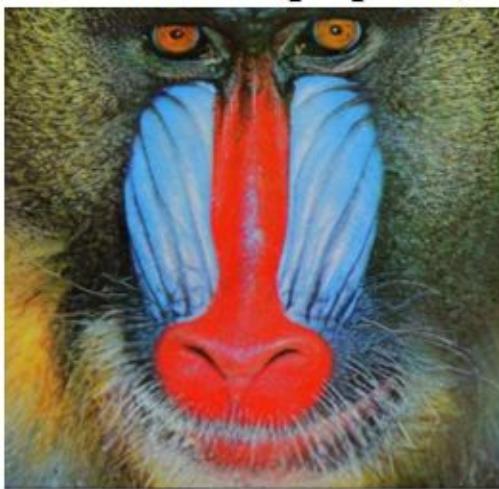
DEEP LEARNING MODEL

DL Models thought upon and chosen

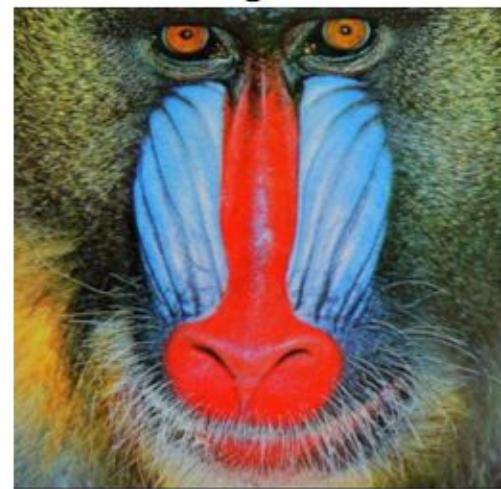
1. VGGNet (due to feature extraction prowess in terms of texture)
2. ResNet (State-of-the-art model and residual property that propagates original image remnants as well)
 - a. ResNet-34
 - b. ResNet-50 (**CHOSEN DUE TO SOTA AND BETTER RESULTS**)

PROPOSED DEEP LEARNING FOR IMPROVING IMAGE QUALITY - Generative Adversarial Networks (GANs)

4× SRGAN (proposed)



original





SERVER

```
@app.route('/api/getSpot', methods=['GET'])
def getSpot():
    return send_file('./static/spot.jpg', mimetype='image/jpeg')

@app.route('/api/getNoSpot', methods=['GET'])
def getNoSpot():
    return send_file('./static/no_spots.jpg', mimetype='image/jpeg')

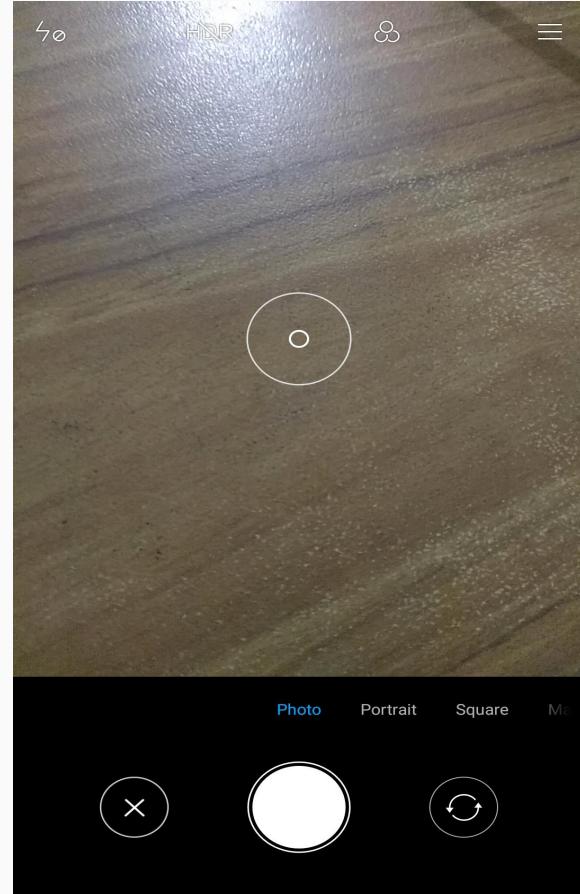
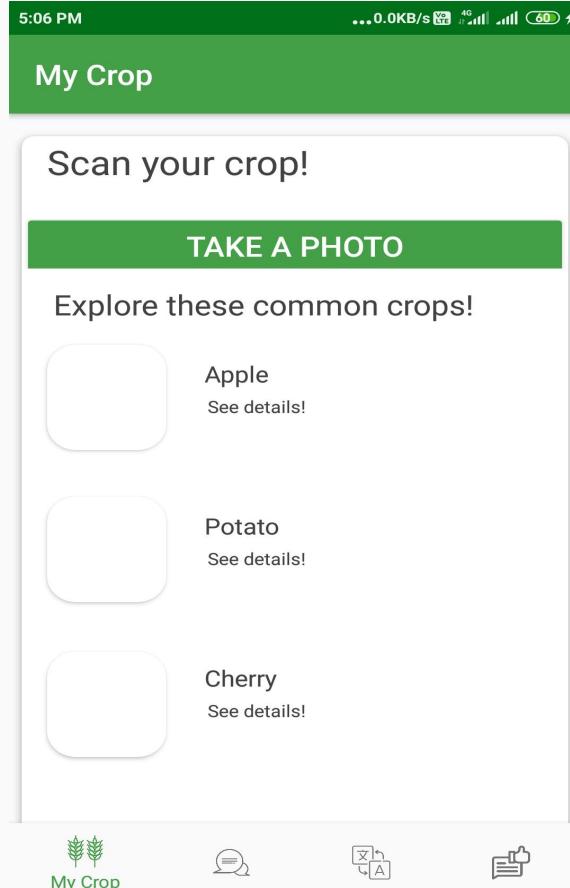
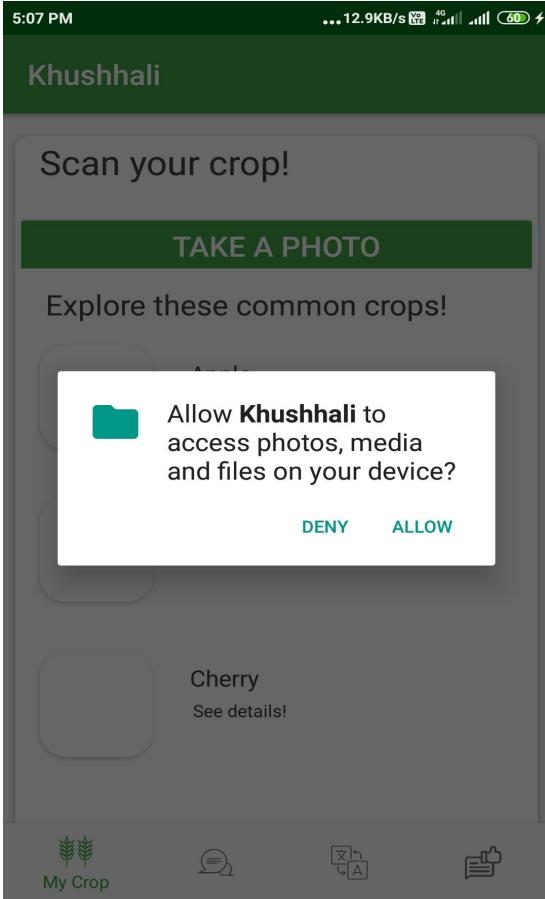
@app.route('/api/getGray', methods=['GET'])
def getGray():
    return send_file('./static/gray.jpg', mimetype='image/jpeg')
```

File Name	Prediction
Potato_Late_Blight3.JPG	Potato_Late_blight
Potato_Late_Blight1.JPG	Potato_Late_blight
Apple_Cedar_Rust2.JPG	Apple_Cedar_apple_rust
Apple_healthy2.JPG	Apple_healthy
Scab_3444.JPG	Apple_Apple_scab
Cherry_Powdery2.JPG	Cherry_(including_sour)_Powdery_mildew
Scab_3330.JPG	Apple_Apple_scab
Apple_healthy1.JPG	Apple_healthy
Apple_healthy3.JPG	Apple_healthy
Apple_Cedar_Rust3.JPG	Apple_Cedar_apple_rust
Potato_Early_Blight3.JPG	Potato_Early_blight
Cherry_Healthy3.JPG	Cherry_(including_sour)_healthy
Apple_BlackRot1.JPG	Apple_Black_rot
Scab_3375.JPG	Apple_Apple_scab
Apple_Cedar_Rust1.JPG	Apple_Cedar_apple_rust
Cherry_Powdery3.JPG	Cherry_(including_sour)_Powdery_mildew
Potato_Early_Blight2.JPG	Potato_Early_blight
Potato_Late_Blight2.JPG	Potato_Late_blight
Potato_Healthy2.JPG	Potato_healthy
Potato_Healthy1.JPG	Potato_healthy
Potato_Early_Blight1.JPG	Potato_Early_blight
Apple_BlackRot3.JPG	Apple_Black_rot
Cherry_Powdery1.JPG	Cherry_(including_sour)_Powdery_mildew
Cherry_Healthy2.JPG	Cherry_(including_sour)_healthy
Apple_BlackRot2.JPG	Apple_Black_rot
Cherry_Healthy1.JPG	Cherry_(including_sour)_healthy
Potato_Healthy3.JPG	Potato_healthy
18.782673	

MOBILE APPLICATION

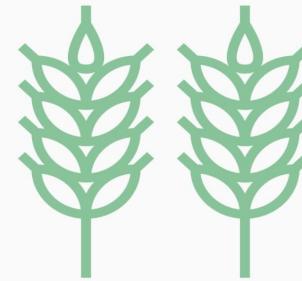


Simple to use Interface





Please take a picture



This is community fragment





This is change language fragment

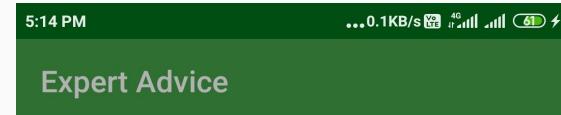


Contact our experts

1. Shubhi Rustagi

VOICE CALL

WHATSAPP



Contact our experts

1. Shubhi Rustagi

VOICE CALL

WHATSAPP

Complete action using



Phone



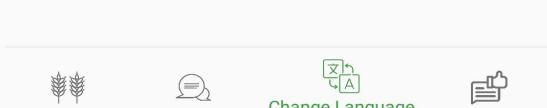
Truecaller



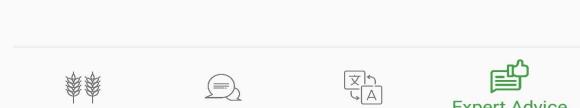
Skype

Remember my choice

Cancel



Change Language



Expert Advice



DISEASE DATABASE

S No	Name of Disease	Fruit/Crop/Plant	Reason	Symptoms	Consequences
		In which it can be found:	As in what causes this disease:	How does it affect plant like by some bite marks and all.	What is harm from it? As in if it damages fruit/crop or stops their growth and all.
1	Apple Scab	Apple	Fungal	Dark, irregularly-shaped lesions develop on the foliage, blossoms and developing fruits The fungal disease forms pale yellow or olive-green spots on the upper surface of leaves and fruits. Dark, velvety spots may appear on the lower surface of the leaf.	Rarely kills its host. Scabby spots are sunken and tan and may have velvety spores in the center. As these spots mature, they become larger and

Duration	Location	Severity of Disease	Natural Remedies	Insecticides/Pesticides
How long this disease can be seen in that plant.	In India where it is most common.	Can be in scale of 1-5 considering points like if it can spread to others, can be cured, cannot be cured and all.		
	Places that have Apple Cultivations	Rarely kills a plant. If severity level is high in some case, it makes the plant prone to other infections.	With or without chemicals, there is no viable cure for an infected tree during the season once damage is present. Spray the apple tree foliage with a fertilizer mixture containing 5% urea. Can also churn the fallen leaves so that the fungus cannot grow in the suitable weather.	Benzimidazole fungicides Organocide Plant Doctor Bonide Orchard Spray

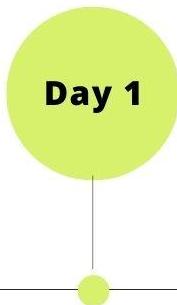
A close-up photograph of a young plant seedling with two large, heart-shaped green leaves emerging from dark brown soil. The background is blurred.

FUTURE PLANS

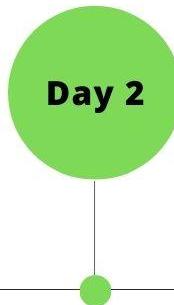
- Regional Language Support
- Integration of Discussion Forum Backend
- Inclusion of Firebase for Disease Database
- Analytics based on Farmer's Location
- Reverse Feedback to improve the accuracy with time
- UI for Forum
- Server Deployment for Py Torch Model
- Rest API Infrastructure for App and Model Communication

OUR JOURNEY

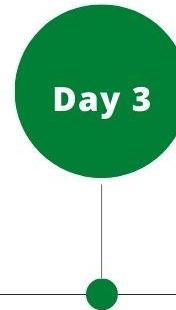
A brief overview of our progress



- Created database for nutrition deficiency diseases
- Segmented leaf from background
- Attempted to segregate affected areas from the leaf.



- Implemented deep learning with good accuracy.
- Constructed basic UI of app
- Found possible solution for nutrient deficiency issue faced earlier



- Found possible solution to solve image quality issue.
- Progress in app development.
- Server establishment.

We would like to share with you the video comprising the overview of our idea.

Inspired by the words of our Honorable Prime Minister Narendra Modi, we present to you, Aarogya Fasal:



Team SAAHASi



Arnab



Honey



Shubhi



Anushrut



Aditi



Saatvik

This project, not only gives us hope,

But also the motivation to work for the interest and well being of our fellow countrymen that go through so much hardship so that the rest of us can sleep with a full stomach

We hope that the horizon of this service not only be bounded by this wonderful opportunity at SIH2020 but also continues to grow as our perseverance to the cause.