

A Graduation Project
Submitted in Partial Fulfillment of B.Sc. Degree
Requirements in Electrical and Computer Engineering
Part II

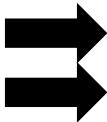
Plant Wheat Detection Using Artificial Intelligence

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OUTLINES



- Problem Definition
- Project Objectives
- Block Diagram
- Literature Survey
 - Traditional learning VS Deep Learning.
 - Advantages of Traditional learning & Deep Learning.
 - Deep Learning Algorithms
- Flow Chart
- System Components
- System Design
- Wheat Detection training
- Results
- Time Plan
- Future Plan
- Cost Analysis
- Conclusion

Problem Definition



- Disease lead to reduction in quality and quantity of agricultural products



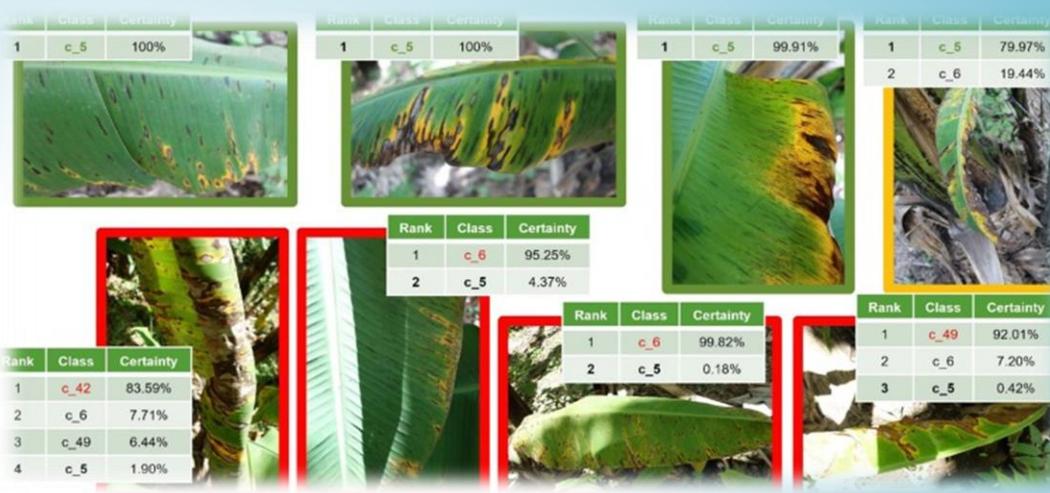
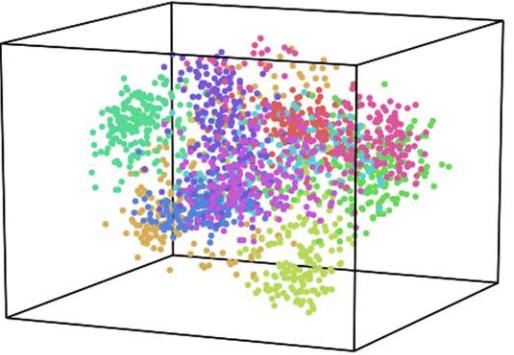
- No monitoring of health and disease on plant.



- saving 300 million people from starvation



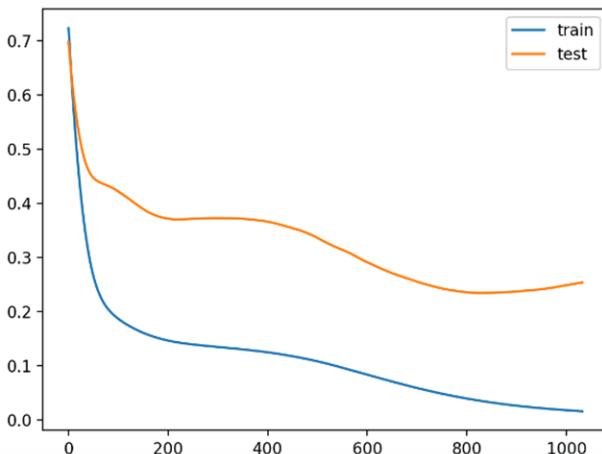
- Wheat is the most cultivated cereal crop in the world.



Project Objectives.

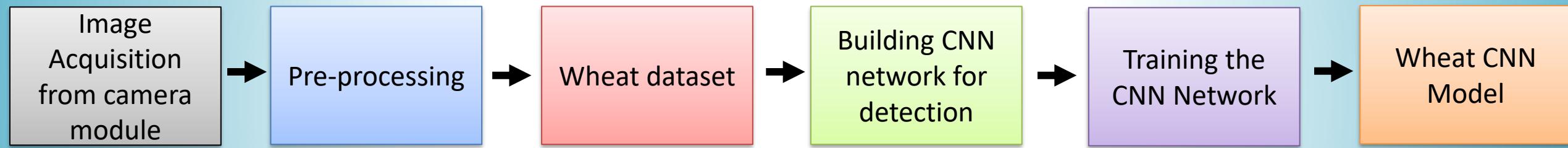


- Determine Feature Extraction techniques.
- Applying the detection of Plant Diseases.
- Train and Test initial model with labelled images
- get most accurate and appropriate result.

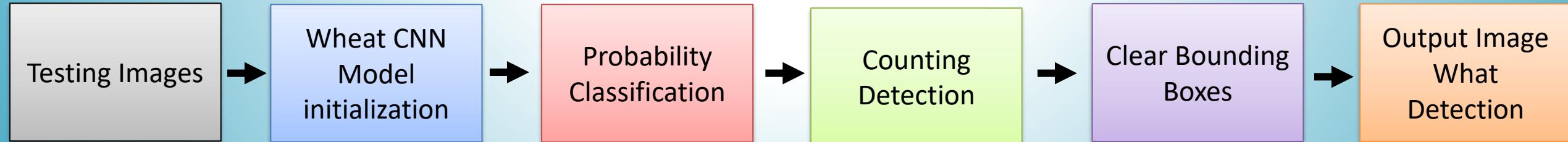


Block Diagram

Training Block Diagram

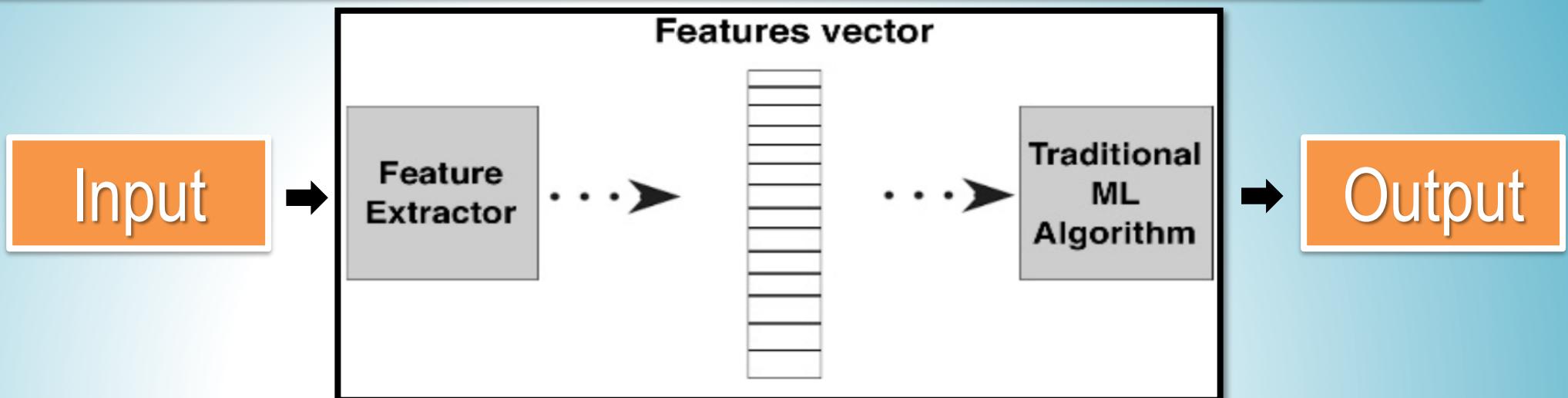


Detection Block Diagram

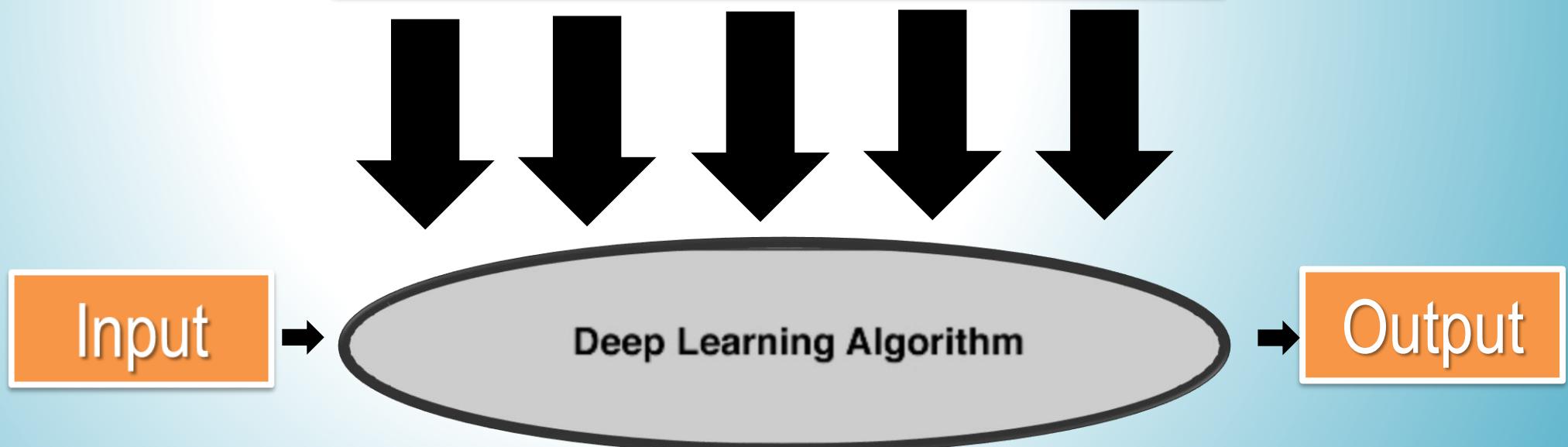


Literature Survey:- Traditional learning VS Deep Learning.

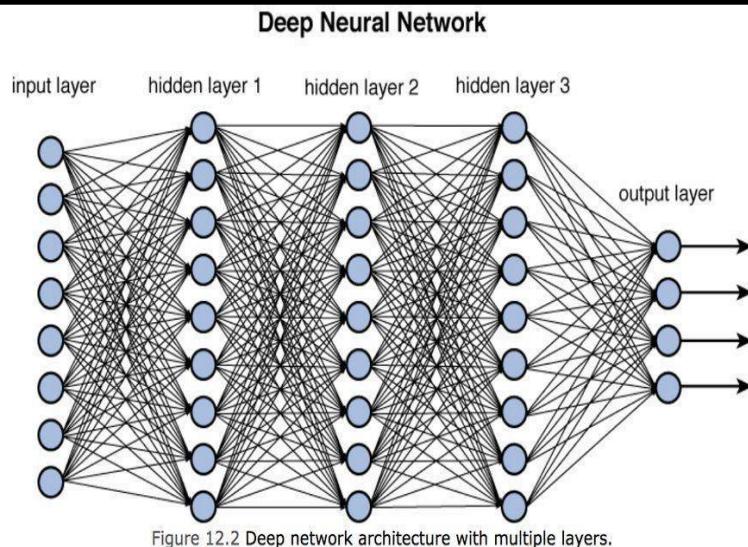
Traditional
Machine
Learning Flow.



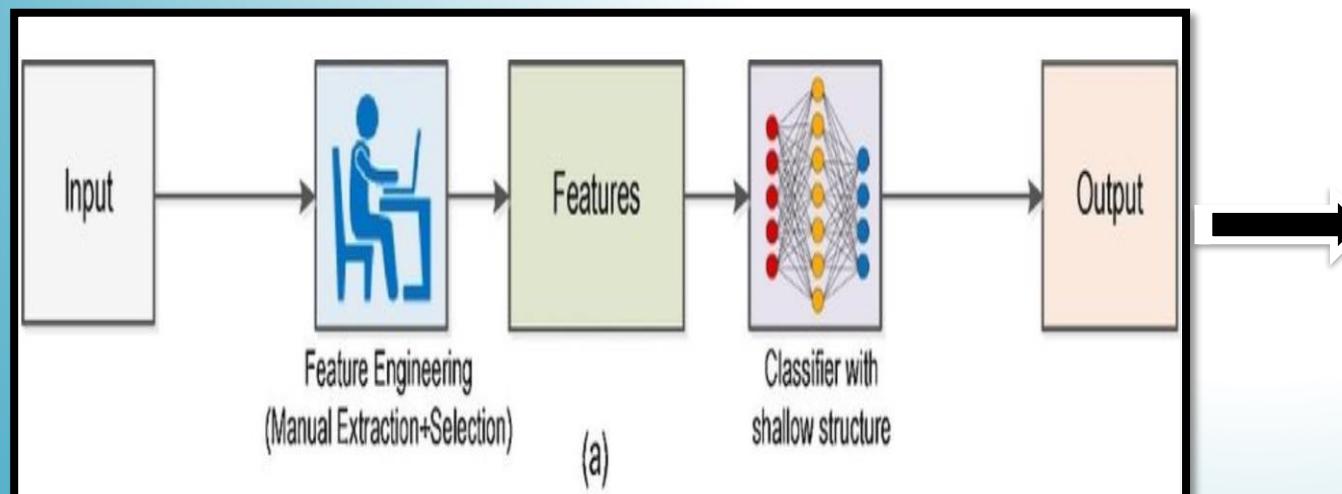
Deep
Learning
Flow.



Literature Survey:- Advantages of Traditional learning & Deep Learning.

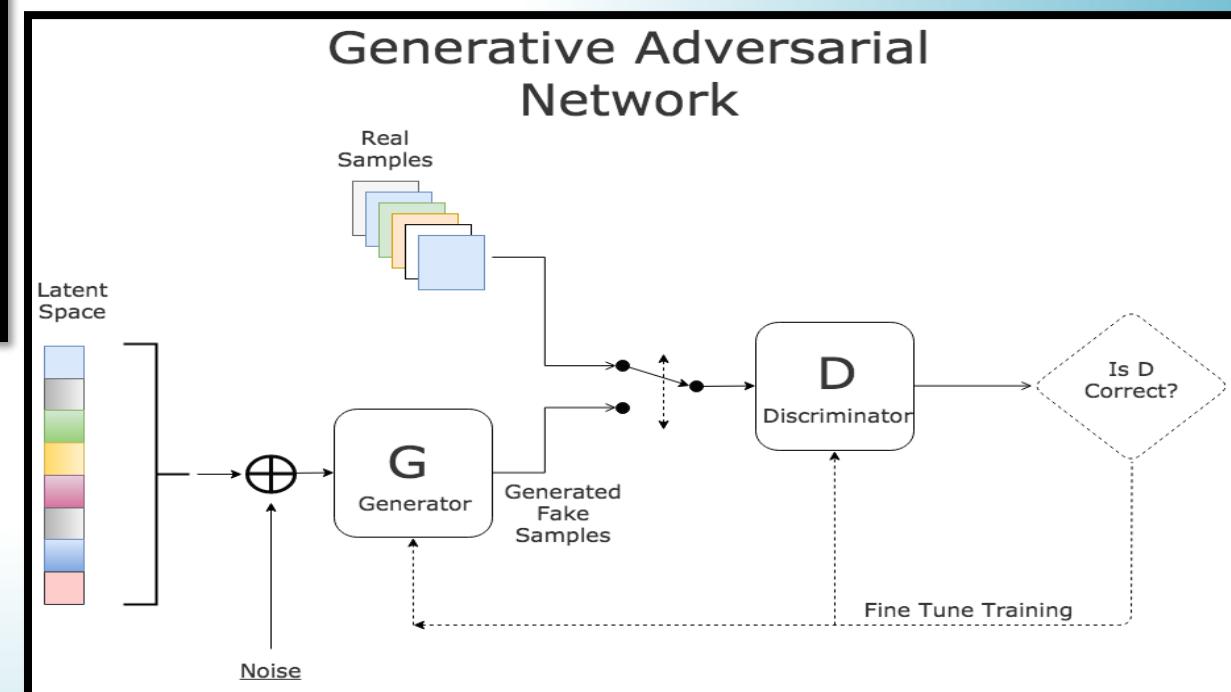
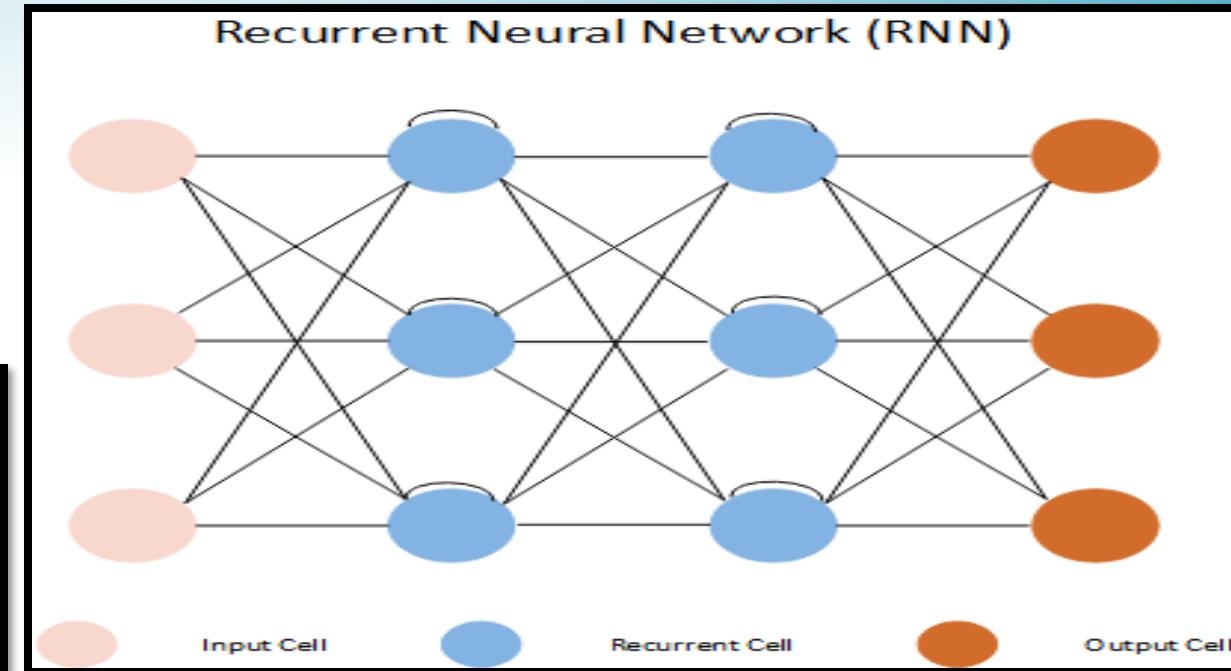
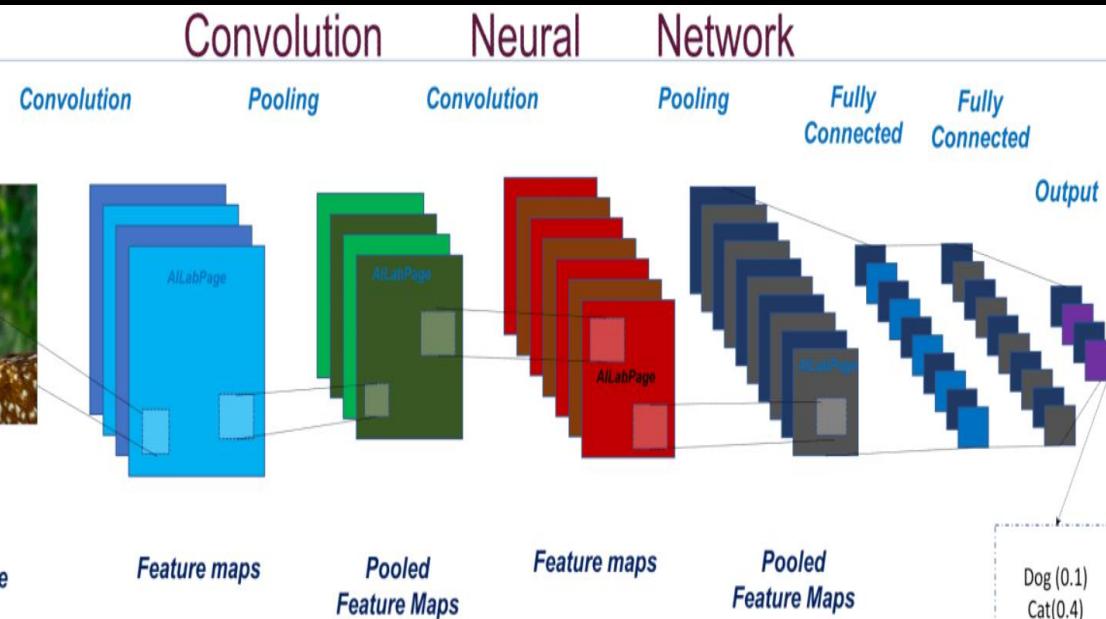


- Robust.
- Generalizable.
- Scalable.
- Reusability



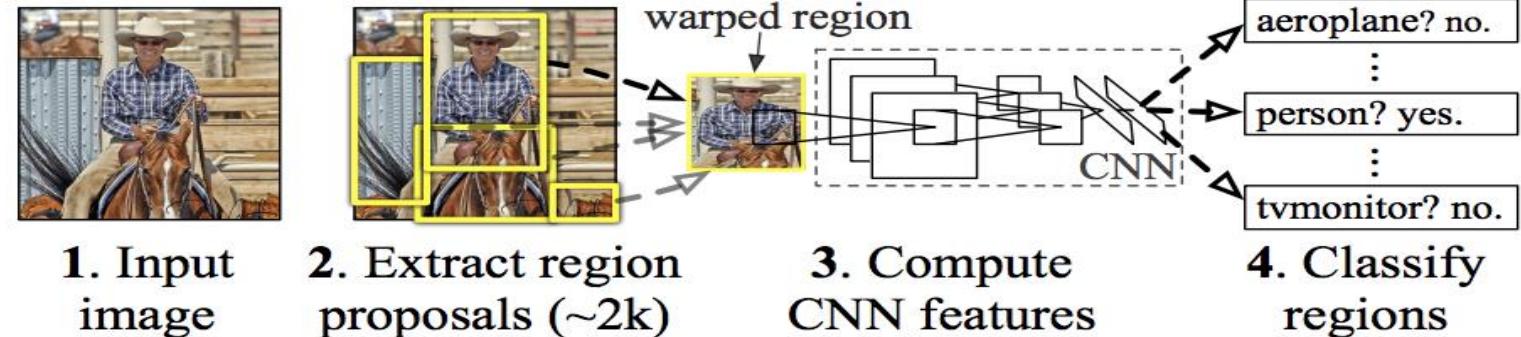
- lower processing power.
- Small amount of data .
- Easy to debug
- Less training time

Literature Survey:- Deep Learning Algorithms

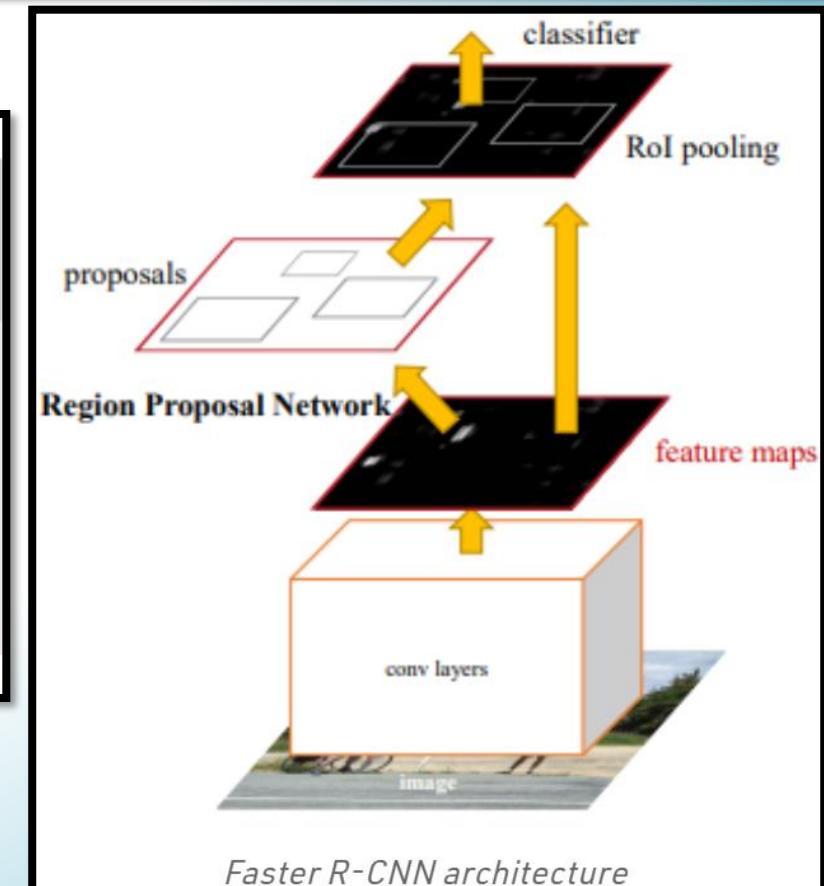
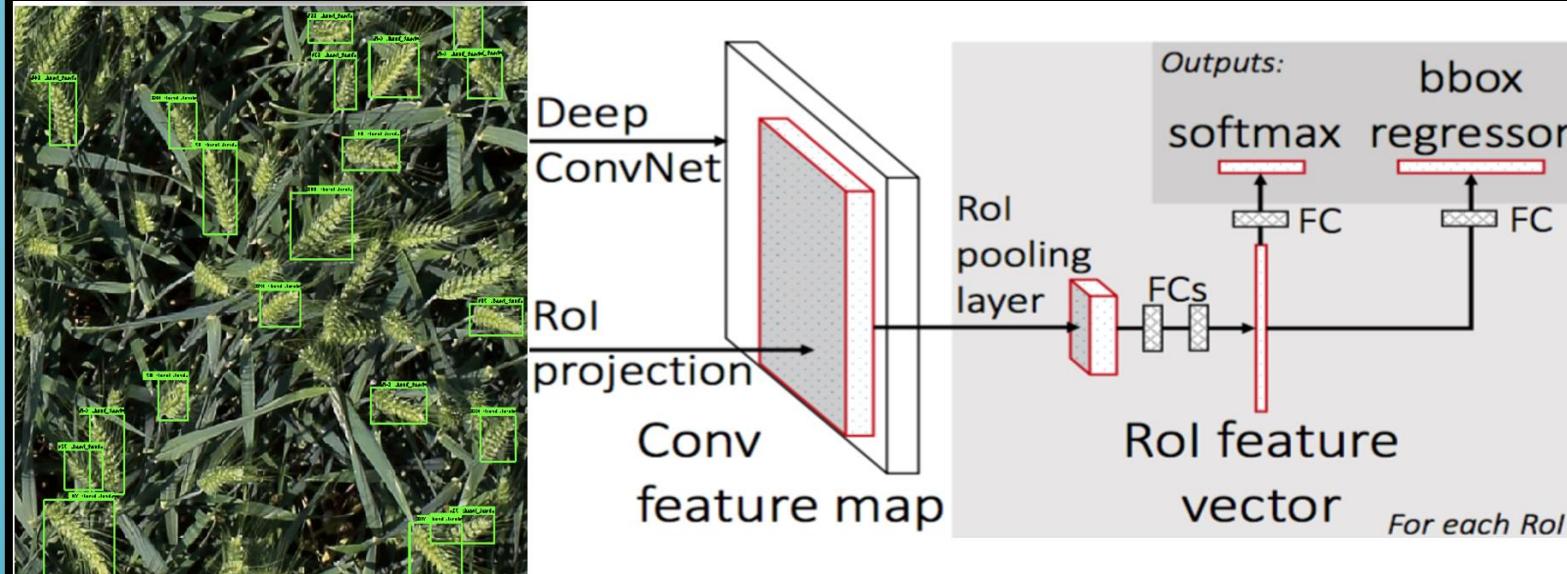


Object Detection Architectures using CNN.

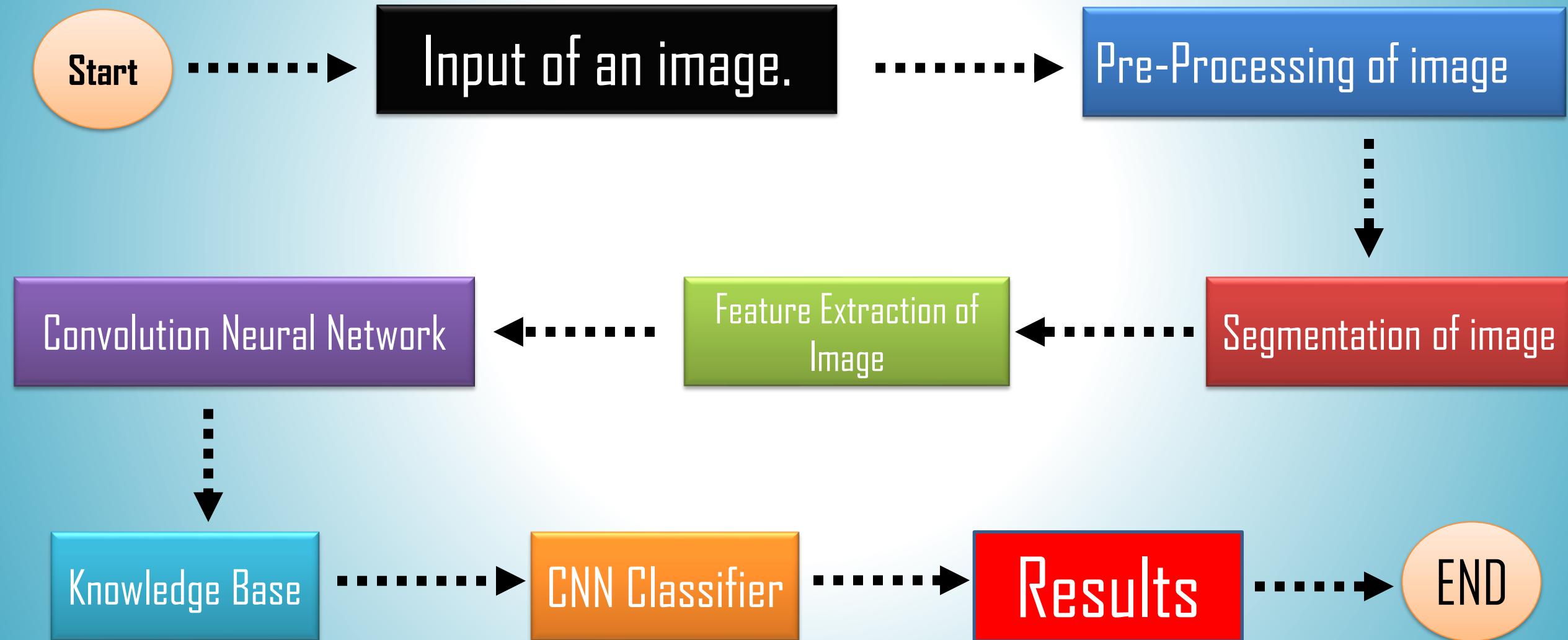
R-CNN: *Regions with CNN features*



Fast R-CNN

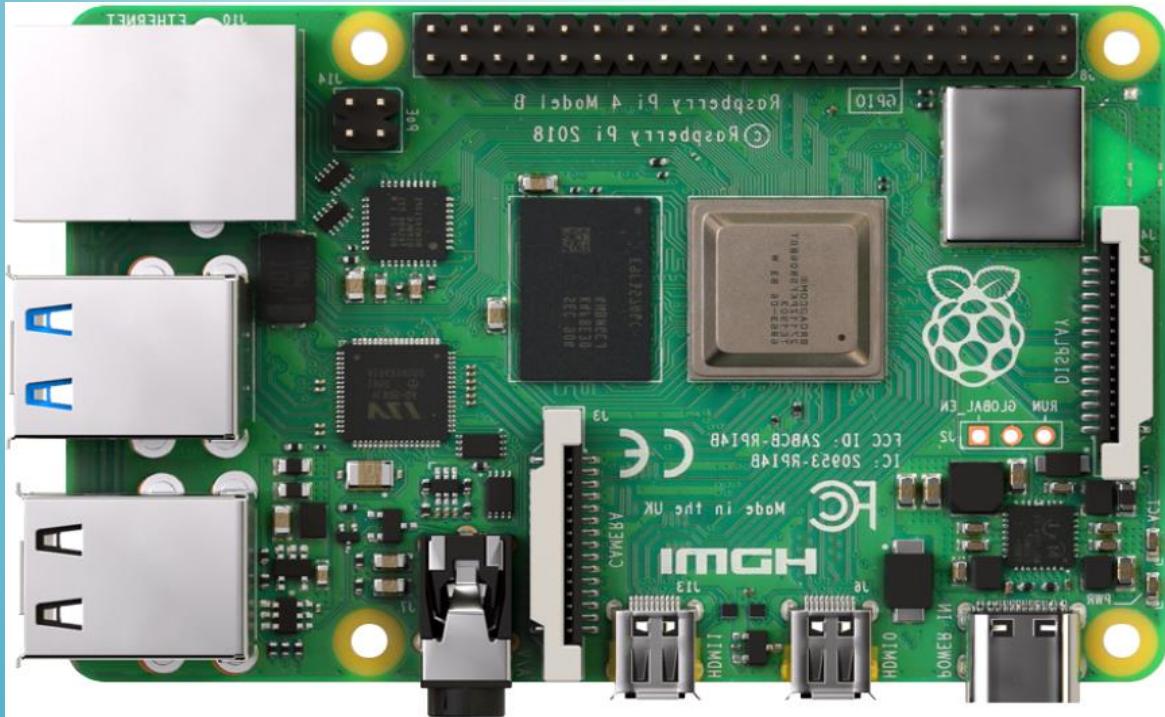


Flow Chart

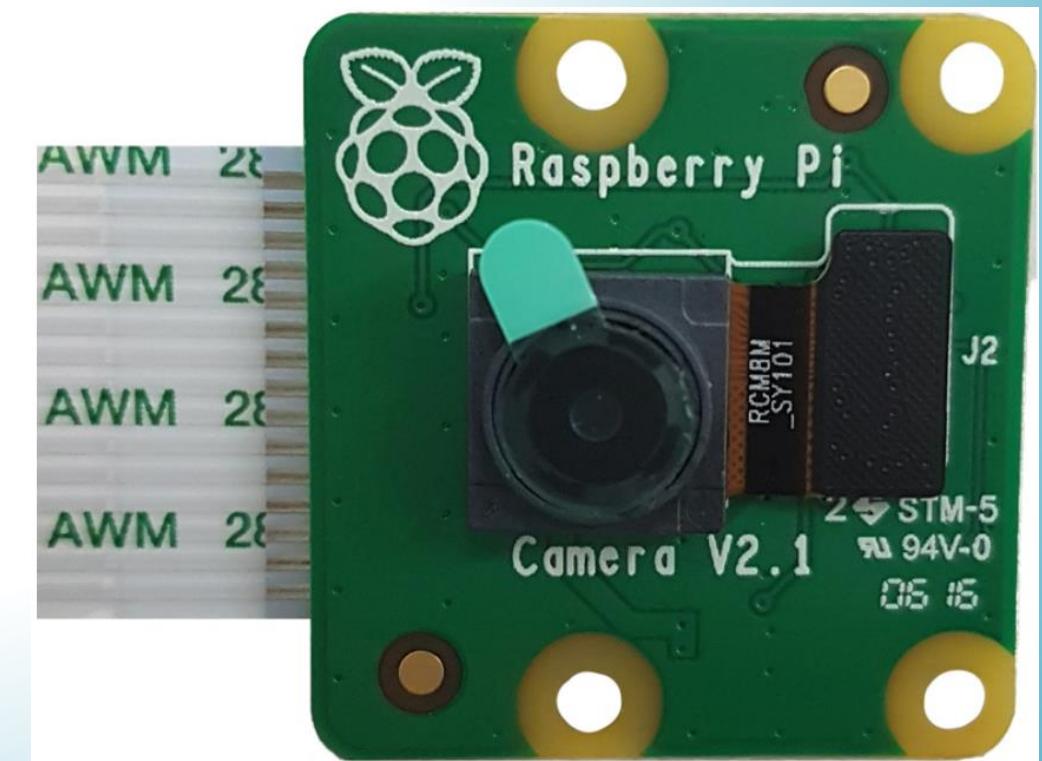


System Components

Raspberry Pi4



CAMERA
MODULE V2



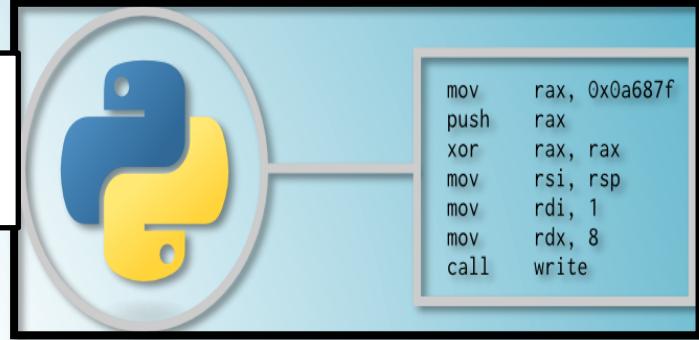
Software :-

Linux OS



Linux
Operating System

Python C



Computer Vision Programs

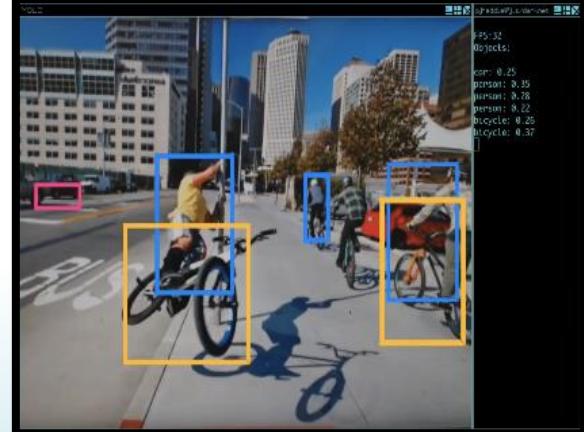
OpenCV



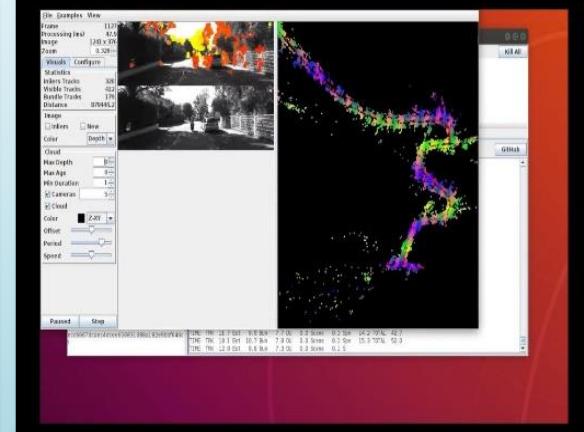
SimpleCV



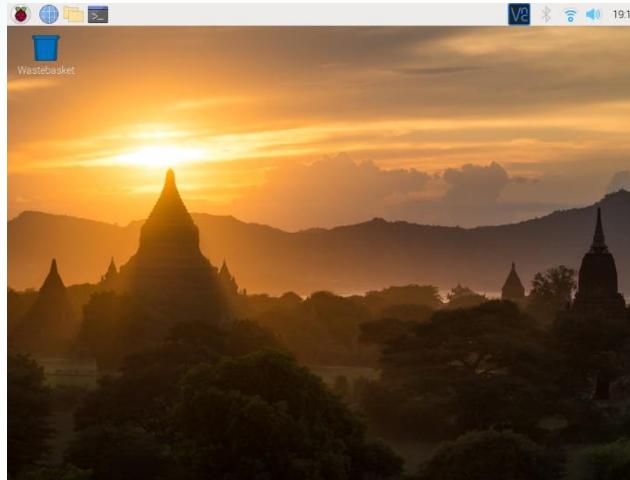
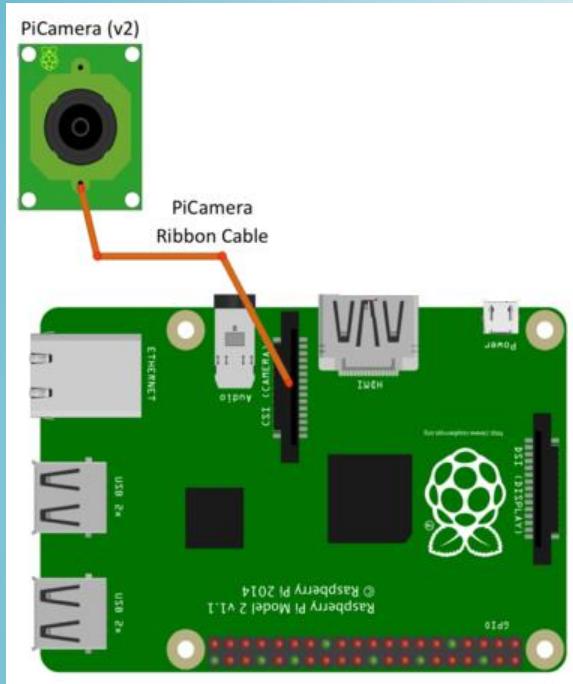
YOLO



BoofCV



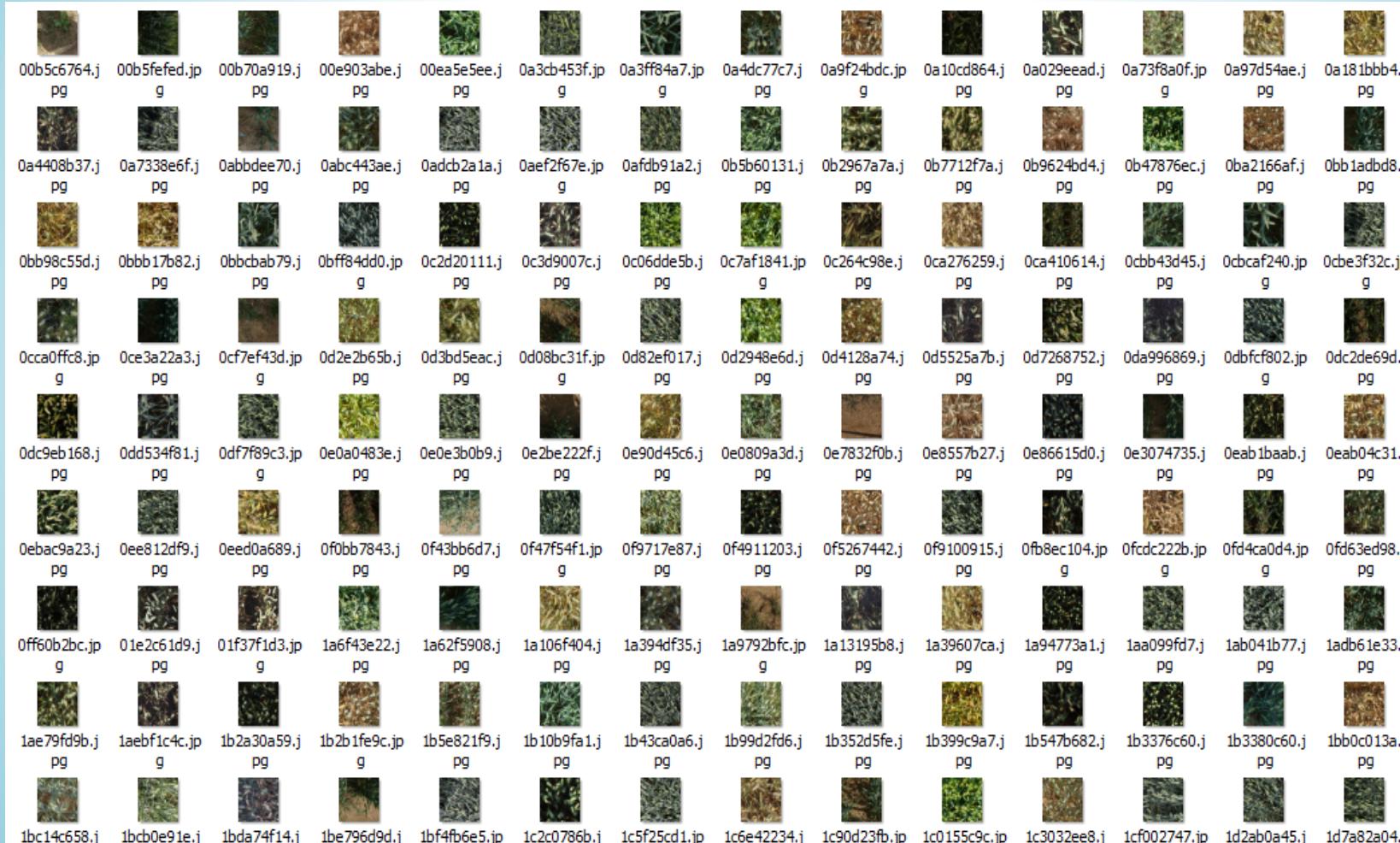
System Design:-



```
pi@pathholes:~ $ python3
Python 3.7.3 (default, Dec 20 2019, 18:57:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import cv2.__version__
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
ModuleNotFoundError: No module named 'cv2.__version__'
>>> import cv2
>>> cv2.__version__
'4.1.0'
>>> exit()
```

```
pi@raspberrypi:~ $ python3
Python 3.7.3 (default, Apr 3 2019, 05:39:12)
[GCC 8.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import tensorflow as tf
>>> tf.__version__
'2.1.0'
>>> 
```

Wheat Spike Training Set



Wheat Spike Detection

Th Thonny - /home/pi/Wheat ~ Thonny - /home/pi/Wheat ~ [wheat] Result2.jpg (1024x1024) 43% 20:53

ni@Wheat:~ Thonny - /home/pi/wheat/wheatpic.py @ 47:20

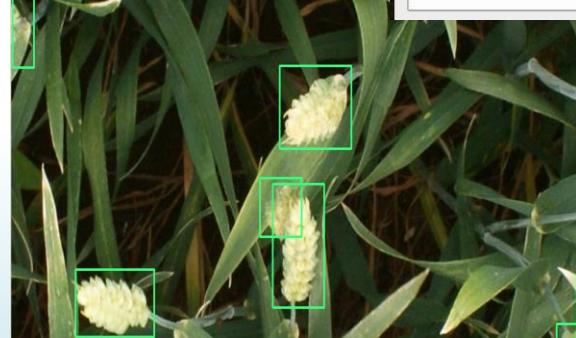
New Load Save Run Debug Over Into Out Stop Zoom Quit Switch to regular mode

wheatpic.py

```
33
34     a=v
35     for i in range(num_detections):
36         classId = int(out[3][i])
37         score = float(out[1][i])
38         bbox = [float(v) for v in out[0][i]]
39
40         if score > 0.3:
41             d=d+1
42             x = bbox[1] * cols
43             y = bbox[0] * rows
44             right = bbox[3] * cols
45             bottom = bbox[2] * rows
46             cv.rectangle(img,
47                         (x, y), (right, bottom),
48                         cv.cvtColor(cv.resize(img, (300,
49                                     300)), cv.COLOR_BGR2RGB),
50                         2)
51
52         print("Wheat Detections = ",d)
53         cv.imwrite('Result2.jpg',img)
54         cv.imshow('Wheat Detection Result',img)
55         cv.waitKey()
```

Shell

```
on.platform.gfile) is deprecated
Instructions for updating:
Use tf.gfile.GFile.
Load Model File
2021-06-08 20:52:57.261576: W tensorflow/gfile/GFile.h:135475200 exceeds 10% of system memory
Wheat Detections = 26
```



Th Thonny - /home/pi/Wheat ~ Thonny - /home/pi/Wheat ~ [wheat] Result3.jpg (1024x1024) 43%

ni@Wheat:~ Thonny - /home/pi/wheat/wheatpic.py @ 18:27

New Load Save Run Debug Over Into Out Stop Zoom Quit Switch to regular mode

wheatpic.py

```
15
16
17
18
19     # Read and preprocess an image.
20     img = cv.imread('test3.jpg')
21     rows = img.shape[0]
22     cols = img.shape[1]
23     inp = cv.resize(img, (300,
24                           300))
25     inp = inp[:, :, [2, 1, 0]]
26
27     # Run the model
28     out = sess.run([sess.graph.
29                   sess.graph.
30                   sess.graph.
31                   sess.graph.
32                   feed_dict={
33
34                     # Visualize detected boundaries
35                     num_detections = int(out[0])
36                     d=a
37
38                     print("Wheat Detections = ",d)
39                     cv.imwrite('Result3.jpg',img)
40                     cv.imshow('Wheat Detection Result',img)
41                     cv.waitKey()
```

Shell

```
on.platform.gfile) is deprecated
Instructions for updating:
Use tf.gfile.GFile.
Load Model File
2021-06-08 20:53:58.528075: W tensorflow/gfile/GFile.h:135475200 exceeds 10% of system memory
Wheat Detections = 33
```

Wheat Spike Detection

Th Thonny - ... > pi@Wheat... /wheat Result3.jpg Result3.jpg (1024x1024) 43% 20:55
ni@Wheat ~ Thonny - /home/pi/wheat/wheatpic.py @ 47:20

New Load Save Run Debug Over Into Out Stop Zoom Quit Switch to regular mode

wheatpic.py

```
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
```

Result4.jpg (1024x1024) 43%

on.platform.gfile) is deprecated
Instructions for updating:
Use tf.gfile.GFile.
Load Model File
2021-06-08 20:55:13.538792: W tensorflow 135475200 exceeds 10% of system
Wheat Detections = 28

Th Thonny - ... > pi@Wheat... /ho... Result3.jpg (10... Result5.jpg (1024x1024) 43% 20:56
ni@Wheat ~ Thonny - /home/pi/wheat/wheatpic.py @ 18:27

New Load Save Run Debug Over Into Out Stop Zoom Quit Switch to regular mode

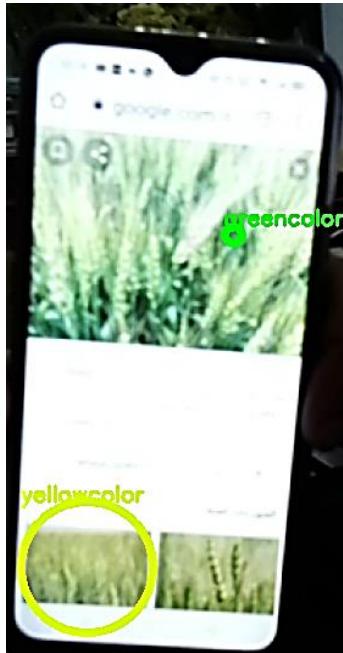
wheatpic.py

```
1
2
3
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18
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```

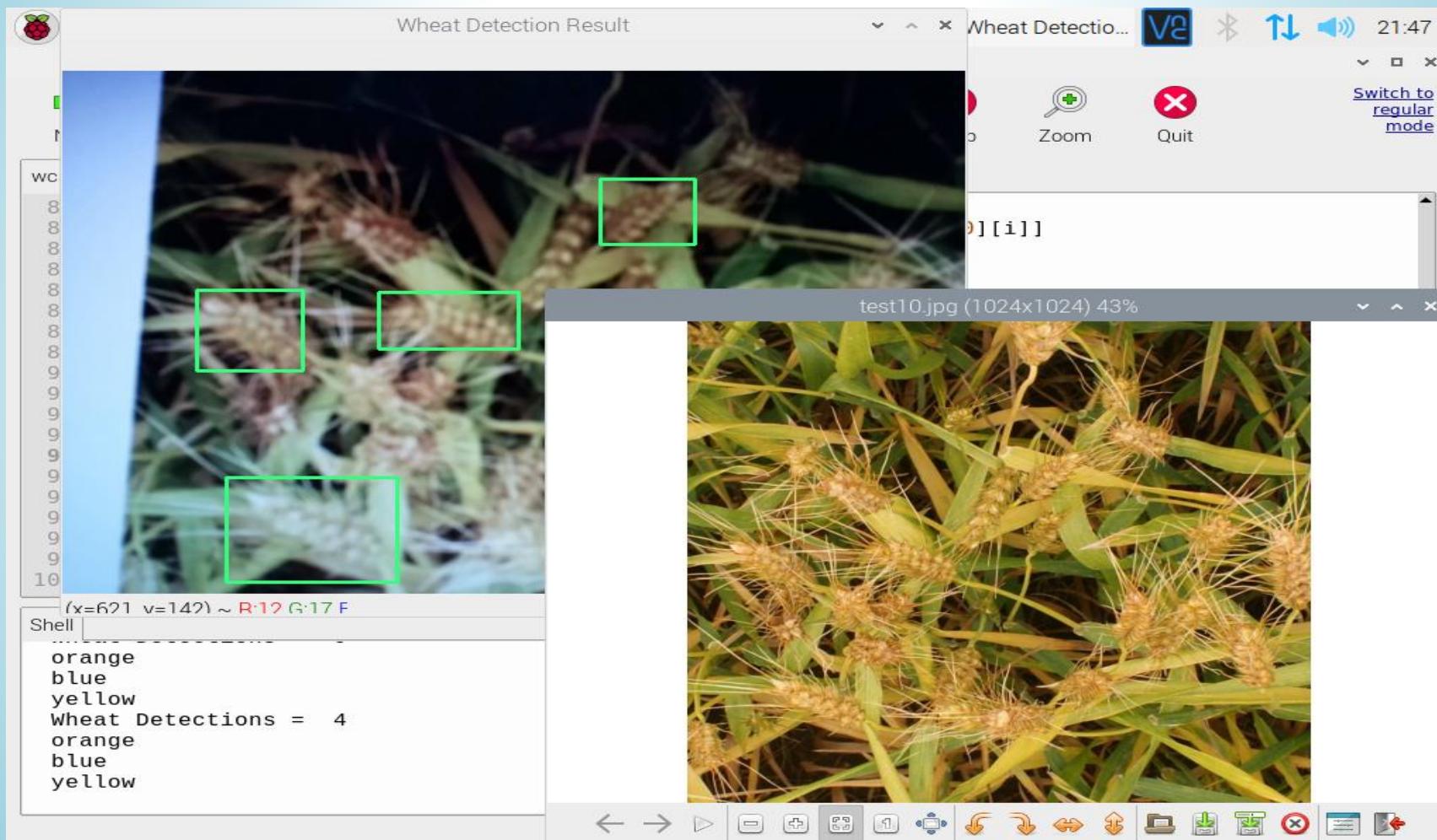
Result5.jpg (1024x1024) 43%

on.platform.gfile) is deprecated
Instructions for updating:
Use tf.gfile.GFile.
Load Model File
2021-06-08 20:56:10.806937: W tensorflow 135475200 exceeds 10% of system
Wheat Detections = 31

Color Detection



wheat spike stream



Time Plan

Task No.	Task Holder	Task Description	Exact Execution Time
	Mahmoud	Buying Components	2 weeks
	Marco	Testing Components	2 weeks
	Mahmoud	Operating System installation over the Raspberry pi board	2 weeks
	Marco	Operating the camera module over the Raspberry Pi	2 weeks
	Mahmoud	Progress Report one	2 weeks
	Marco		
	Mahmoud	Training the wheat objects	1 week
	Marco	Detecting the wheat objects	1 week
1.	Mahmoud	Counting the wheat detected	1 week
1.	Marco	Color detection method	1 week
1.	Mahmoud	Progress Report Two	2 weeks
1.	Marco		
1.	Mahmoud	Increase the performance speed and time	2 weeks
1.	Marco	Increase the accuracy of video stream detection	2 weeks
1.	Mahmoud	Project assembly	2 weeks
1.	Marco	Project Testing	2 weeks
1.	Mahmoud	Final Preparation	2 weeks
1.	Marco		

Time Plan

Future Work

- Increasing the wheat spike database and increasing its accuracy.
- Adding a wheat leaf disease to evaluate the wheat disease types
- Increase the accuracy of detection over live stream.
- Decrease the detection time using faster algorithms for wheat spike detection.
- Classify the type of wheat spike.

Cost Analysis

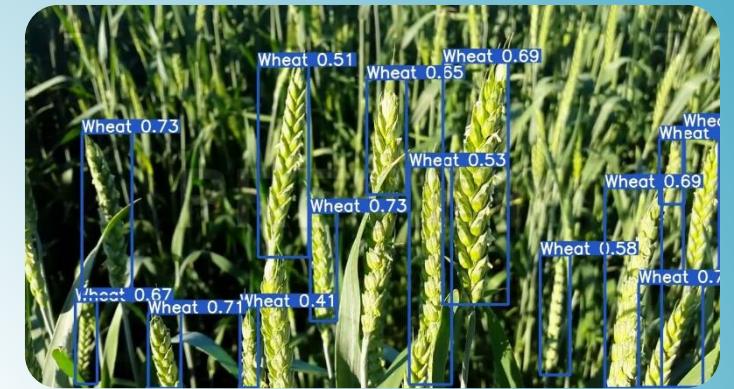
Item	Cost
Raspberry Pi 4	2000 L.E.
Camera Module	800 L.E.
Total	2800 LE



Conclusion



- Improving accuracy up to 86 % .
- Increasing response speed around 300 ms .
- Implement the Hardware & Software of project .



Thank
you!!

**ANY
QUESTIONS?**

