Pest detection Using Digital image Processing

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PROBLEM STATEMENT

Most of the farmers used the traditional pest management methods which is the regular spray program which sometimes kill useful insects that help in eradicating pests.The old methods trap the insect pests and are brought to the laboratory for counting and identifying manually which are used to estimate the pest density.However this process is tedious and time consuming for a crop technician and also lead to low count accuracy and delays in obtaining accurate counts.

OBJECTIVE and OUTCOME

PEST DETECTION USING IMAGE PROCESSING to ensure improved and better farming techniques for farmers. In other words, Image analysis for automated pest detection.

LITERATURE SURVEY

Title	Methods	Drawbacks	Accuracy
Compression based Algorithm	The Segmentation tries to find the pattern of the image and any consistency in the image can be used to compare conceivable segment and coding length of data.	It pre suppose that the optimal segmentation is the one that minimizes the overall conceivable segment and coding length of data.	Size reduction and Customized loading time increases the accuracy.
Corner Response base method	3 stages involved: a) Computing corner response in multi scale space and thresholding it to get the candidate region of text. b) Verifying the candidate region by combining colour and size range feature. c) Locating the text line using bounding box.	In corner points, in video frame are used to generated connected components but they use just the number of corner points, not CR, to classify text and non text regions.	Has high curvature in the region boundary. A novel text detection and localization method based on corner response.
Edge detection Algorithm	This is well developed field on its own within image processing. Used as a base of another segmentation technique since there is often a shape adjustment in intensity at the region boundaries.	Time consuming and difficult to implement to reach the real time response. The edge identified by edge detection is often disconnected.	SInce Sharp and thin edges are used it leads to greater efficiency in text recognition but difficult to get maximum accuracy.

Datasets, Descriptions and Links

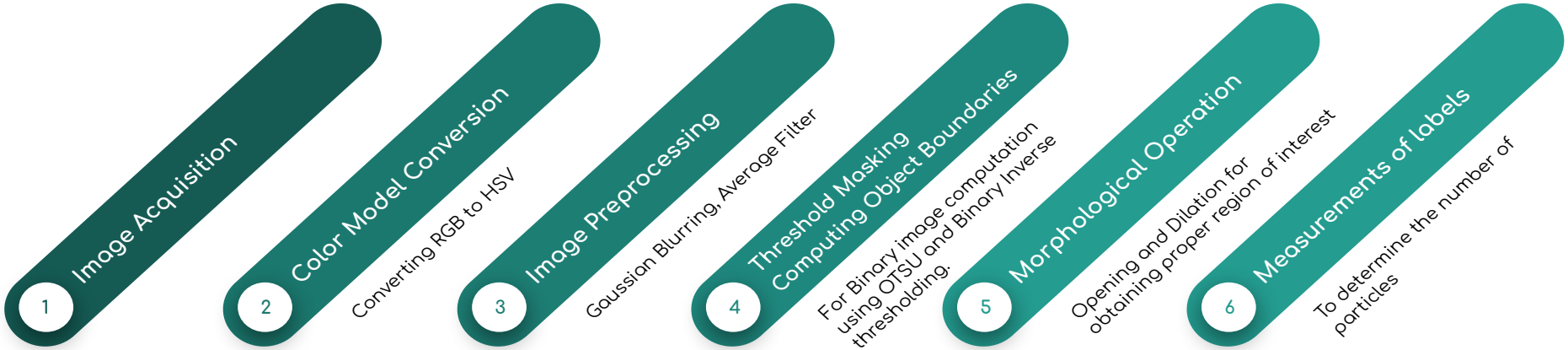
Link:

- https://www.ipmimages.org/
- https://bugguide.net/node/view/15740
- https://www.kaggle.com/rhammell/ships-in-satellite-imagery/version/1

Software Details

- **OpenCV with C++/Python :** It is a library which is designed for computational efficiency with a strong focus on real time applications.
- **Numpy and Scipy** : using numpy and Scipy that allows us to manipulate mathematical structures for image, and visualize the data and image attributes.
- **Jupyter Notebook and Google Colab :** As coding and team collaboration environment.
- **Matplotlib:** Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy

System Design



FUTURE ENHANCEMENT

- Currently the project depicts what type of pest are affected to leaves but by applying machine learning algorithm we can predict in which season we have most pest and their types
- Creating an ecosystem to continuously analyse a field using Cyber Physical Systems and a cloud infrastructure which can be accessed by the end user by the means of a mobile app.
  This can be used for:
  - Continuous Monitoring
  - Pesticide Usage Management
  - Pesticide Delivery Scheduling
  - Strategize Preventive and Avoidance Measures

DRAWBACKS

- In terms of Dataset:
    - Training may need to be repeated to maintain quality. Raters are expensive.
    - Initial and important challenges are dataset,disease grading(need experienced person).
    - There can be substantial inter-rater and intra-rater variability (subjectivity).
- Particular disease identification.
- Region variations in prevalence of particular pest

BIBLIOGRAPHY

- https://ieeexplore.ieee.org/document/7873750
- https://ieeexplore.ieee.org/document/8229828
- https://www.researchgate.net/publication/271305520
- https://ieeexplore.ieee.org/document/8365226
- https://www.researchgate.net/publication/282119578
- https://www.researchgate.net/publication/335395832

In [11]:
```
y_pred = clf.predict(x_test)
```

In [12]:
```
print("Accuracy: "+str(accuracy_score(y_test, y_pred)))
print('\n')
print(classification_report(y_test, y_pred))
```

```
Accuracy: 0.915625


              precision    recall  f1-score   support

         0.0       0.90      1.00      0.95       234
         1.0       1.00      0.69      0.81        86

    accuracy                           0.92       320
   macro avg       0.95      0.84      0.88       320
weighted avg       0.92      0.92      0.91       320
```

Thank You

Hardware Details

- **IP Camera module** : To capture and transfer the image
- **Arduino** : A microcontroller which will do the following functions: hover, obstacle sensing and path determination
- **SD Card** : to save the captured images and further can be inserted in a mobile or a laptop
- **Brushless Motors,Propeller Set** : Flying the drone
- **Multi-Copter Frame** : A frame for the drone
- **A laptop/Android mobile** : For report analysis