INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY
HYDERABAD

R&D SHOWCASE 2021

Automated Seed Quality Testing System

Seed Quality Testing

Pipeline

- Data Acquisition
- Fake Image generation
- Image Classification
- Testing
- Experiments

Agriculture is the basic and the widest area for work and has a large number of diverse problem sets related which can be solved using the Computer Vision and the new state-of-the-art (ML models).

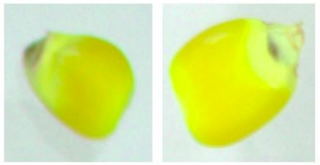
Manual inspections have many problems in maintaining consistency and ensuring a satisfactory detection efficiency.

Huge labor work.

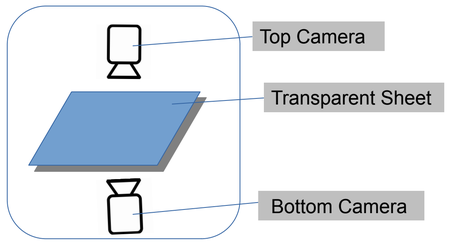
Data-set & Fake Image Generation

Image Acquisition

-Corn seed's images have been acquired in a controlled environment.



Top and Bottom View

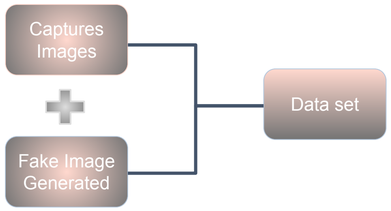


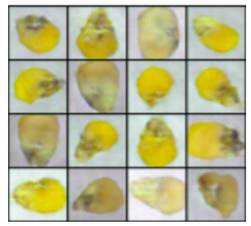
Fake Images Generation

-Generate the fake images to balanced the data set and increase the diversity of the class instances.

Image-to-Image Generation

- DCGAN, BigGAN
- Conditional Image Generation
- Image-to-Image Generation





Class Broken(Fake Image)

Labeling the images

Manually

Seeds Classes:

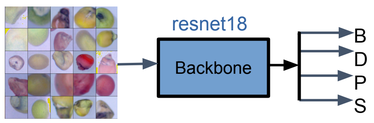
1. Broken(B)
2. Discolored(D)
3. Pure(P)
4. Silkcut(S)

Class	Real + Fake (Instances)
Broken	7267 + 2937
Discolored	5670 + 2938
Pure	3114 + 5823
Silkcut	1751 + 5823

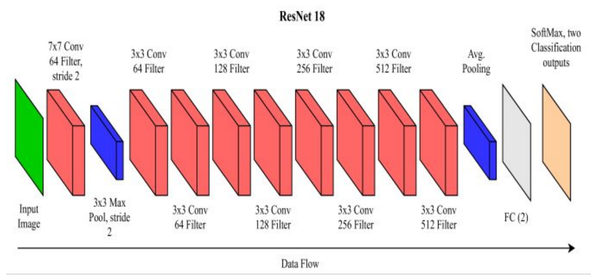
Classification

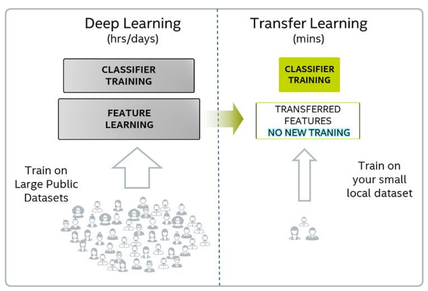
Image Classification- Supervised Deep Learning, Transfer Learning.

Resnet18, VGG16, GoogleNet, Mobilenet.



Fine-grained classification-challenging due to the difficulty of finding discriminative features.

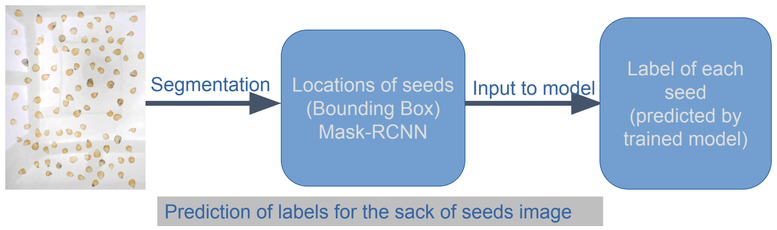




Experiments & Results

Accuracy

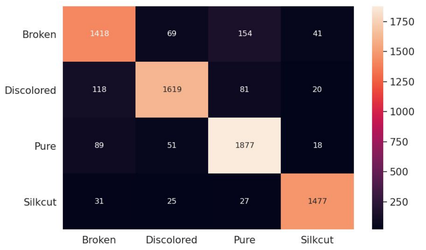
DNN	Before adding fake images	After adding fake images
resnet18	71.58 %	89.62 %



Prediction of labels for the sack of seeds image

Confusion Matrix

There are some images in the dataset which may belong to more than one class and creates the confusion for the classifier



Application

- Provide suggestions and Insight to farmers.
- Agricultural Automation.
- Monitoring growth of crops.
- Classification and quality inspection of agricultural products.

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