

# Progress Presentation - I

e-Yantra Summer Internship - 2017  
Vegetable Identification  
using Transfer Learning

Sanket Shanbhag

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## **Mentors:**

Saurav

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# Overview of Project

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## ■ Objectives

- 1 Use weights from existing image-classification models to train a new model.
- 2 To identify and label images from 32 different classes (vegetables) grown in the farm upto a reasonable accuracy.
- 3 Integrate the module with existing logging system to automate the process.

## ■ Deliverables

- 1 Complete system for vegetable identification integrated with logging website.
- 2 Report and presentation.

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Table: My caption

Task	Deadline
Gather the dataset from the image-net data source	3 Days
Installation of all the required libraries on the machine	2 Days
Use Transfer Learning pretrained model to predict the accuracy of the image data collected from the farm	5 Days
Integrate the camera module with the weighing pan to capture the images of vegetables	2 Days
Start integrating this system with the front end interface and Develop Conv-Net from scratch for comparison analysis.	5 Days
Add Image Processing to find the count of vegetables	8 Days
Predict the accuracy using Res-Net model and compare the results obtained from Conv-Net and transfer learning	7 Days
Finish the integration with the web-interface and handle the misclassification of images	5 Days
Presentation and Report	2 Days

# Tasks Accomplished

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- Understood Neural Networks, Convolutional Neural Networks and Transfer Learning.
- Collected dataset of approximately 1000 images of each class by scraping the internet (URL's from ImageNet).
- Mounted camera on existing weighing scale to acquire test images.
- Removed the last fully connected layer of the Inception-v3 model to train the transfer values of images on new layer of 9 classes.
- Achieved approximately 85% accuracy on the above model.

# Inception architecture

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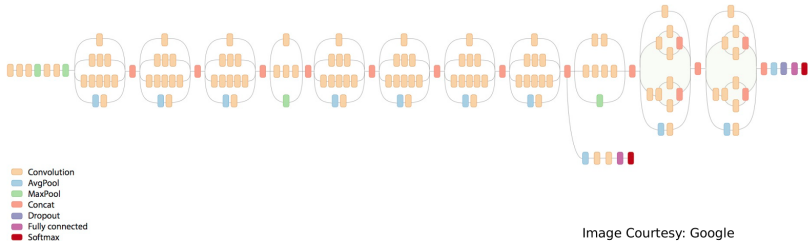
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Brinjal 300px x 300px

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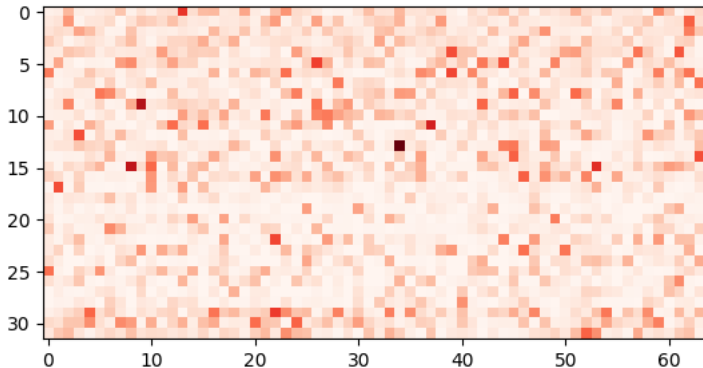
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Transfer Values of above plotted image.

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Brinjal 300px x 300px



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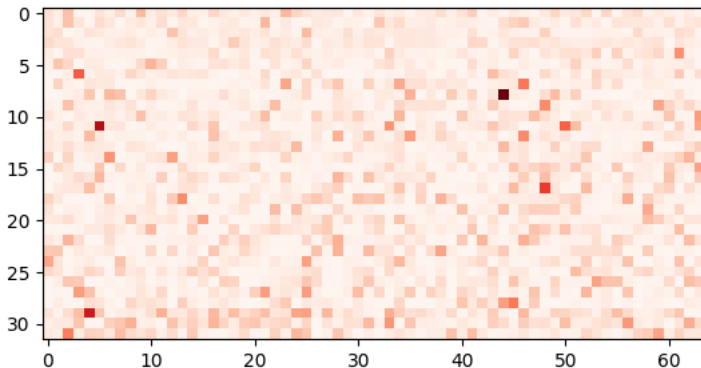
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Transfer Values of above plotted image.

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Onion 300px x 300px

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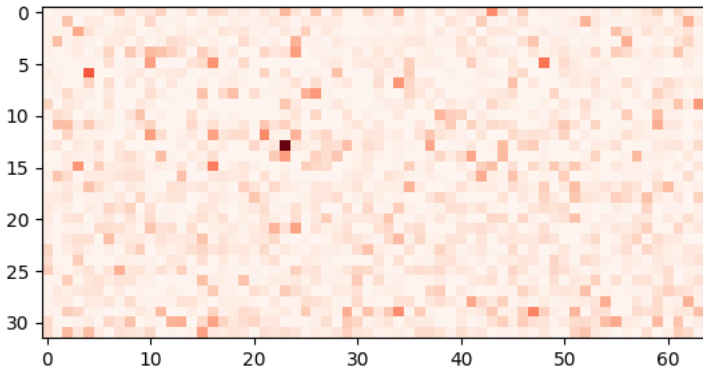
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Onion 300px x 300px



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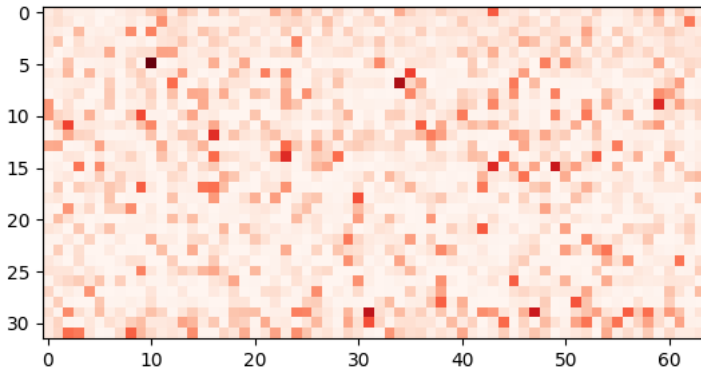
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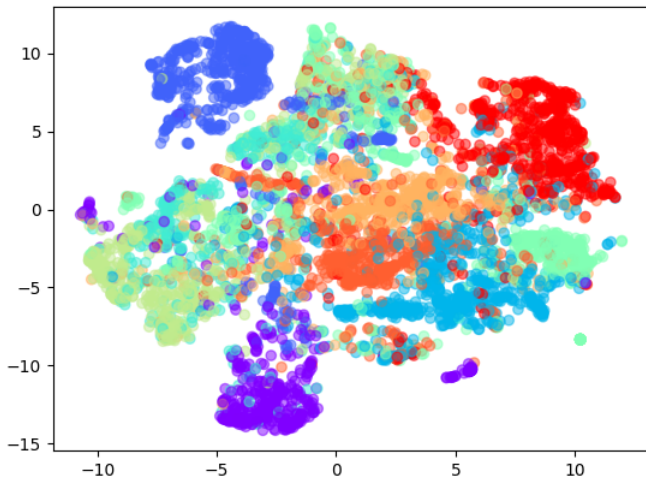
Future Plans

Thank You



Transfer Values of above plotted image.

# t-Distributed Stochastic Neighbor Embedding (t-SNE)



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Before Training

Accuracy on Test-Set: 11.2% (189 / 1692)

After training

Accuracy on Test-Set: 83.9% (1419 / 1692)

Example errors:

Confusion Matrix:

[120	1	1	4	1	3	3	4	0]	(0)	cabbage
[ 0	172	2	1	4	0	1	0	1]	(1)	cauliflower
[ 0	1	166	0	12	3	8	8	2]	(2)	brinjal
[ 7	2	0	114	12	19	6	1	2]	(3)	spinach
[ 2	2	8	3	147	11	4	1	1]	(4)	ladyfinger
[ 0	2	2	12	3	156	5	1	2]	(5)	coriander
[ 0	0	7	1	2	5	113	2	5]	(6)	beetroot
[ 3	0	10	0	7	4	16	205	7]	(7)	onion
[ 1	1	9	2	7	4	6	6	226]	(8)	tomato
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		

# Example errors

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True: spinach  
Pred: ladyfinger



True: cauliflower  
Pred: beetroot



True: spinach  
Pred: coriander



True: onion  
Pred: beetroot



True: ladyfinger  
Pred: brinjal



True: beetroot  
Pred: brinjal



True: ladyfinger  
Pred: brinjal



True: beetroot  
Pred: tomato



True: spinach  
Pred: coriander



# Challenges Faced

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- Not enough relevant data.
- Lack of memory for training Convolutional Neural Network from scratch.
- Classifying vegetables with similar features.

# Future Plans

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Sr. No	Work to be done	No. of days required(approx.)
1	Integrate this module with the logging system.	5
2	Train a Conv-Net from scratch and try to achieve reasonable accuracy.	10
3	Add Image Processing to find count of vegetables which are counted rather than weighed.	8
4	Collect and classify data.	Parallel

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