

Group Id:-BE Comp/PRJ/18-19/25

Vaibhav Jawale

Abhijith S Nair

Harish Nitin Alhate

Rahul Kumar Das

Title of the topic: Object Detection and classification using Internet of the Things and Image Processing for the Application of Monitoring Disease in Plant : A Recognition System

Area of topic: Internet of Things, Deep Learning, Image Processing

1) Abstract:

The Internet of things (IOT) along with Deep Learning is remodeling the agriculture, enabling the farmers with the wide range of techniques such as precision and sustainable agriculture to face challenges in the field. IOT technology helps in collecting information about conditions like weather, moisture, temperature and fertility of soil and Deep Learning provides a new approach to the development of plant disease recognition model, based on leaf image classification, by the use of deep convolution networks.

The developed model is able to recognize 13 different types of plant diseases out of healthy leaves, with the ability to distinguish plant leaves from their surroundings. Inception Model, a deep learning framework developed by Google, was used to perform the deep CNN training. The experimental results on the developed model achieved precision between 91% and 98%, for separate class tests.

IOT leverages farmers to get connected to their farm from anywhere and anytime. IoT devices are used for monitoring the farm conditions and control and automate the farm processes. To view remotely the conditions in the form of image, wireless cameras have been used. A smart phone empowers farmer to keep updated with the ongoing conditions of his agricultural land using IOT at any time and any part of the world. IOT technology can reduce the cost and enhance the productivity of traditional farming.

2) Briefs about Contents:

2.1) Purpose and Motivation: Discusses about the reason and motivation behind the idea of this project.

2.2) Scope: Discusses about the various goals the project is intended to achieve.

2.3) Perspective and functions: Discusses about working of the project and different functions the project will provide for the good of the user.

2.4) User Classes and Characteristics: Defines who all will be the users of the final system established and what be role of each user.

2.5) Operating Environment : Discusses about the various software as well as hardware needed to run the project.

Hardware Required:-

- Raspberry Pi kit
- Camera Module
- Wi-Fi Module

2.6) Working: Discusses about working of the system (Google's Inception Model).

2.7) Applications:

Automation in farming.

Detecting disease in plants.

3) References / Bibliography

- [1] Crop Recommendation System for Precision Agriculture (S.Pudumalar, E.Ramanujam, R.HarineRajashree, C.Kavya, T.Kiruthika, J.Nisha2016).
- [2] Agricultural Crop Monitoring using IOT- A Study (Dr. D.K. Sreekantha, Kavya.A.M 2017).
- [3] A Smart Phone Image Processing Application for Plant Disease Diagnosis (Nikos Petrellis 2017).
- [4] Implementation of IoT and Image Processing in Smart Agriculture (AyushKapoor, SuchetaBhat, Shidnal, AkashMehra 2016).
- [5] Using Deep Learning for Image-Based Plant Disease Detection (SharadaP.Mohanty, David P.Hughes and Marcel Salathé 2016).
- [6] DeCAF: A Deep Convolutional Activation Feature for Generic Visual Recognition(Jeff Donahue, YangqingJia, OriolVinyals, Judy Hoffman, Ning Zhang, Eric Tzeng, Trevor Darrell 2013).
- [7] Deep Neural Networks Based Recognition of Plant Diseases by Leaf Image Classification (SrdjanSladojevic, Marko Arsenovic, AndrasAnderla, DubravkoCulibrk, and DarkoStefanovic 2016).
- [8] J. G. ArnalBarbedo, “Digital image processing techniques for detecting, quantifying and classifying plant diseases,” Springer-Plus, vol. 2, article 660, pp. 1–12, 2013.
- [9] S. Sankaran, A. Mishra, R. Ehsani, and C. Davis, “A review of advanced techniques for detecting plant diseases,” Computers and Electronics in Agriculture, vol. 72, no. 1, pp. 1–13, 2010.
- [10] S. B. Patil and S. K. Bodhe, “Leaf disease severity measurement using image processing,” International Journal of Engineeringand Technology, vol. 3, no. 5, pp. 297–301, 2011.
- [11] T. Rumpf, A.-K.Mahlein, U. Steiner, E.-C.Oerke, H.-W.Dehne, and L. Plümer, “Early detection and classification of plant diseases with Support VectorMachines based on hyperspectral reflectance,” Computers and Electronics in Agriculture, vol. 74, no. 1, pp. 91–99, 2010.
- [12] B. C. Karmokar, M. S. Ullah, Md. K. Siddiquee, and K. Md.R. Alam, “Tea leaf diseases recognition using neural network ensemble,” International Journal of Computer Applications, vol. 114, no. 17, pp. 27–30, 2015.