

Advances of Image Processing in Precision Agriculture: Using Deep Learning Convolution Neural Network for Soil Nutrient Classification

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Abstract : Agriculture is essential to the continuous existence of human life as they directly depend on it for the production of food. The exponential rise in population calls for a rapid increase in food with the application of technology to reduce the laborious work and maximize production. Technology can aid/improve agriculture in several ways through pre-planning and post-harvest by the use of computer vision technology through image processing to determine the soil nutrient composition, right amount, right time, right place application of farm input resources like fertilizers, herbicides, water, weed detection, early detection of pest and diseases etc. This is precision agriculture which is thought to be solution required to achieve our goals. There has been significant improvement in the area of image processing and data processing which has being a major challenge. A database of images is collected through remote sensing, analyzed and a model is developed to determine the right treatment plans for different crop types and different regions. Features of images from vegetations need to be extracted, classified, segmented and finally fed into the model. Different techniques have been applied to the processes from the use of neural network, support vector machine, fuzzy logic approach and recently, the most effective approach generating excellent results using the deep learning approach of convolution neural network for image classifications. Deep Convolution neural network is used to determine soil nutrients required in a plantation for maximum production. The experimental results on the developed model yielded results with an average accuracy of 99.58%.

Keywords : convolution, feature extraction, image analysis, validation, precision agriculture

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