

**STUDIES ON COMPUTER VISION BASED
IDENTIFICATION OF SPECIES AND MATURITY
STAGES FOR SOME MEDICINAL PLANTS
AND AGRICULTURAL PRODUCES**

Thesis submitted by

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Abstract of the thesis Studies on Computer Vision based Identification of Species and Maturity Stages for Some Medicinal Plants and Agricultural Produces

Different agricultural products like the fruits, medicinal plant leaves and vegetables show myriad remedial effects against different types of diseases of any levels of criticalities. The neem, tulsi, kalmegh plants are well connected with Ayurveda field and are being used in treatment of various critical and chronic human diseases with high potentiality. Such plants show natural healing towards blood pressure, digestion disorder, blood purification, skin diseases and chronic diseases like cancer etc. The bioactive present in these plants control the remedial qualities with variable amount from one plant to another. The fruits tomato, banana etc are also contributing majorly towards the wellbeing of human health for curing diseases osteoporosis and cardiovascular due to the presence of the calcium, potassium, magnesium, manganese minerals etc. Banana show the multiple remedial signs like fighting anemia, controlling blood pressure etc. The lycopene in tomato is accountable for remedies of cancer. The variation of nutrients in banana and tomato occur from one species to another and within different maturity stages. The plant diseases due to fungal and bacterial infections are quite common which can spread and damages the plants easily. The manual procedure of identification of such diseases are time consuming, subjective and invasive.

The species and maturity discrimination of different medicinal plants and fruits of different species and maturity levels have been studied using CNN models with highest accuracy value obtained at 99%. Different types of tomato plant leaves of diseases have been explored with weighted mobileNet achieving 98% accuracy. All the mentioned studies include collection, preprocessing and formation of training and test set. The model in all the cases have been optimized with Particle Swarm Optimization (PSO), Gray wolf Optimization (GWO) and optimized GWO achieving highest accuracy values in all cases.