So regarding to our crop yield prediction we have come with various idea with many authors and scientist have wrote before and the some of the research work goes as follows.

An Intelligent Irrigation Scheduling System UsingLow-Cost Wireless Sensor Network Toward Sustainable and Precision Agriculture

Agricultural irrigation developments have gained attention to improve crop yields and reduce water use. However, traditional irrigation requires excessive amounts of water and consumes high electrical energy to schedule irrigations. This paper proposes a fuzzy-based intelligent irrigation scheduling system using a low-cost wireless sensor network (WSN). The fuzzy logic system takes crop and soil water variabilities into account to adaptively schedule irrigations. The theoretical crop water stress index (CWSI) is calculated to indicate plant water status using canopy temperature, solar irradiation, and vapor pressure de_cit. Furthermore, the soil moisture content obtained by a capacitive soil moisture sensor is used as a determination of water status in soil. These two variables are thus incorporated to improve the precision of the irrigation scheduling system. In the experiment, the proposed irrigation scheduling system is validated and compared with existing conventional irrigation systems to explore its performance. Implementation of this system leads to a decrease in water use by 59.61% and electrical energy consumption by 67.35%, while the crop yield increases by 22.58%. The experimental results reveal that the proposed irrigation scheduling system is effective in terms of precision irrigation scheduling and ef_cient regarding water use and energy consumption. Finally, the cost analysis is performed to con_rm the economic bene_t of the proposed irrigation scheduling system.

Exploiting Hierarchical Features for Crop Yield Prediction Based on 3-D Convolutional Neural Networks and Multikernel Gaussian Process

Accurate and timely prediction of crop yield based on remote sensing data is important for food security. However, crop growth is a complex process, which makes it quite difficult to achieve better performance. To address this problem, a novel 3-D convolutional neural multikernel network is proposed to capture hierarchical features for predicting crop yield. First, a full 3-D convolutional neural network is constructed to maximally explore deep spatial–spectral features from multispectral images. Then, a multikernel learning (MKL) approach is proposed for fusion of intraimage deep spatial–spectral features and intersample spatial consistency features. Specifically, we assign a group of nonlinear kernels for each feature in the MKL framework, which provides a robust way to fit features extracted from different domains. Finally, the probability distribution of prediction results is obtained by a kernel-based method.We evaluate the performance of the proposed method on China wheat yield prediction and offer detailed and systematic analyses of the performance of the proposed method. In addition, ourmethod is comparedwith several competing methods. Experimental results demonstrate that the proposed method has certain advantages and can provide better prediction performance than the competitive methods.

A Multi-Modal Approach for Crop Health Mapping Using Low Altitude Remote

Sensing, Internet of Things (IoT) and Machine Learning

The agriculture sector holds paramount importance in Pakistan due to the intrinsic agrarian nature of the economy. Pakistan has its GDP based on agriculture, however it relies on manual monitoring of crops, which is a labour intensive and ineffective method. In contrast to this, several cutting edge technologybased solutions are being employed in the developed countries to enhance the crop yield with the optimal use of resources. To this end, we have proposed an integrated approach for monitoring crop health using IoT,machine learning and drone technology. The integration of these sensing modalities generate heterogeneous data which not only varies in nature (i.e. observed parameter) but also has different temporal _delity. The spatial resolution of these methods is also different, hence, the optimal integration of these sensing modalities and their implementation in practice are addressed in the proposed system. In our proposed solution, the IoT sensors provide the real-time status of environmental parameters impacting the crop, and the drone platform provide the multispectral data used for generating Vegetation Indices (VIs) such as Normalized Difference vegetation Index (NDVI) for analyzing the crop health. The NDVI provides information about the crop based on the chlorophyll content, which offers limited information regarding the crop health. In order to obtain a rich and detailed knowledge about crop health, the variable length time series data of IoT sensors and multispectral images were converted to a _xed-sized representation to generate crop health maps. A number of machine and deep learning algorithms were applied on the collected data wherein deep neural network with two hidden layers was found to be the most optimal model among all the selected models, providing an accuracy of (98.4%). Further, the health maps were validated through ground surveys and by agriculture experts due to the absence of reference data. The proposed research is basically an indigenous, technology based agriculture solution capable of providing important insights into the crop health by extracting complementary features from multi-modal data set, and minimizing the crop ground survey effort, particularly useful when the agriculture land is large in size.

Crop Yield Prediction Using Deep Reinforcement Learning Model for Sustainable Agrarian Applications

Predicting crop yield based on the environmental, soil, water and crop parameters has been a potential research topic. Deep-learning-based models are broadly used to extract signi_cant crop features for prediction. Though these methods could resolve the yield prediction problem there exist the following inadequacies: Unable to create a direct non-linear or linear mapping between the raw data and crop yield values; and the performance of those models highly relies on the quality of the extracted features. Deep reinforcement learning provides direction and motivation for the aforementioned shortcomings. Combining the intelligence of reinforcement learning and deep learning, deep reinforcement learning builds a complete crop yield prediction framework that can map the raw data to the crop prediction values. The proposed work constructs a Deep Recurrent Q-Network model which is a Recurrent Neural Network deep learning algorithm over the Q-Learning reinforcement learning algorithm to forecast the crop yield. The sequentially stacked layers of Recurrent Neural network is fed by the data parameters. The Q- learning network constructs a crop yield prediction environment based on the input parameters. A linear layer maps the Recurrent Neural Network output values to the Q-values. The reinforcement learning agent incorporates a combination of parametric features with the threshold that assist in predicting crop yield. Finally, the agent receives an aggregate score for the actions performed by minimizing the error and maximizing the forecast accuracy. The proposed model ef_ciently predicts the crop yield outperforming existing models by preserving the original data distribution with an accuracy of 93.7%

Estimation of Crop Yield From Combined Optical and SAR Imagery Using Gaussian Kernel Regression

The synthetic aperture radar (SAR) interferometric coherence can complement optical data for the estimation of crop growth parameters, but it has not been yet investigated for predicting crop yield. Many studies have used machine-learning methods, such as neural networks, random forest, and Gaussian process regression, to estimate crop yield from remotely sensed data. However, their performance depends on the amount of available ground truth data. This study proposed Gaussian kernel regression for rice yield estimation from optical and SAR imagery using a limited amount of ground truth data. The main objective was to investigate the synergetic use of Sentinel-2 vegetation indices and Sentinel-1 interferometric coherence data through Gaussian kernel regression for estimating rice grain yield. The prediction accuracy was assessed using *in situ* measured yield data collected in 2019 and 2020 over Xinghua county in Jiangsu Province, China. In all cases, Gaussian kernel regression outperformed the probabilistic Gaussian regression and Bayesian linear inference. With the independently used optical and SAR data, a better prediction accuracy was achieved with the optical red edge difference vegetation index (RDVI1) (r_2 =0.65,RMSE=0.61 t/ha) than with the interferometric coherence (r_2 = 0.52 and RMSE = 0.79 t/ha).The highest prediction accuracy can be achieved by combining RDVI1 with interferometric coherence at the heading stage (r_2 = 0.81 and RMSE = 0.55 t/ha). The results suggest the valueof synergy between satellite interferometric coherence and optical indices for crop yield mapping with Gaussian kernel regression.