

Disease Level Assessment in Wheat Plots Using a Residual Deep Learning Algorithm

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Abstract : The assessment of disease levels in crop fields is an important and time-consuming task that generally relies on expert knowledge of trained individuals. Image classification in agriculture problems historically has been based on classical machine learning strategies that make use of hand-engineered features in the top of a classification algorithm. This approach tends to not produce results with high accuracy and generalization to the classes classified by the system when the nature of the elements has a significant variability. The advent of deep convolutional neural networks has revolutionized the field of machine learning, especially in computer vision tasks. These networks have great resourcefulness of learning and have been applied successfully to image classification and object detection tasks in the last years. The objective of this work was to propose a new method based on deep learning convolutional neural networks towards the task of disease level monitoring. Common RGB images of winter wheat were obtained during a growing season. Five categories of disease levels presence were produced, in collaboration with agronomists, for the algorithm classification. Disease level tasks performed by experts provided ground truth data for the disease score of the same winter wheat plots were RGB images were acquired. The system had an overall accuracy of 84% on the discrimination of the disease level classes.

Keywords : crop disease assessment, deep learning, precision agriculture, residual neural networks

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