

Object detection and classification using few-shot learning in smart agriculture: A scoping mini review

ABSTRACT

Smart agriculture is the application of modern information and communication technologies (ICT) to agriculture, leading to what we might call a third green revolution. These include object detection and classification such as plants, leaves, weeds, fruits as well as animals and pests in the agricultural domain. Object detection, one of the most fundamental and difficult issues in computer vision has attracted a lot of attention lately. Its evolution over the previous two decades can be seen as the pinnacle of computer vision advancement. The detection of objects can be done via digital image processing. Machine learning has achieved significant advances in the field of digital image processing in current years, significantly outperforming previous techniques. One of the techniques that is popular is Few-Shot Learning (FSL). FSL is a type of meta-learning in which a learner is given practice on several related tasks during the meta-training phase to be able to generalize successfully to new but related activities with a limited number of instances during the meta-testing phase. Here, the application of FSL in smart agriculture, with particular in the detection and classification is reported. The aim is to review the state of the art of currently available FSL models, networks, classifications, and offer some insights into possible future avenues of research. It is found that FSL shows a higher accuracy of 99.48% in vegetable disease recognition on a limited dataset. It is also shown that FSL is reliable to use with very few instances and less training time.