Commentary

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Comprehensive Review of Computer Vision-Based and Machine Learning-Based Mushroom Studies

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Description

Due to their low calorie and fat content, as well as their high fiber content, mushrooms are gaining popularity among consumers. Additionally, mushrooms have recently emerged as an effective treatment for a variety of diseases, including cancer. As a result, the mushroom crop industry is under increasing pressure to find sustainable ways to boost productivity and quality. At present, palatable mushroom items normally come from development or wild picking. Because of this, picking wild mushrooms is only appropriate for private consumption. What's more, likewise important wild mushrooms might prompt harming because of an absence of expert information. Interestingly, mushroom development in view of the industrialized mode prompts significant returns and superior grade, so this mode has turned into the significant wellspring of mushrooms available today. However, because mushroom cultivation involves labor-intensive work in almost every aspect of production in addition to the harvest phase, this strategy also faces the serious issue of a labor shortage.

Development of Effective Nonlinear Information Processing Algorithms for Complex Data Analysis

In recent years, the agricultural sector has utilized image processing and machine vision technology more frequently in order to reduce the costs of equipment and increase computational capacities. In contrast to the traditional methods, which primarily rely on manual labor, these modern approaches have significant advantages and potentials for quickly and accurately monitoring the production process. To evaluate noninvasive phenotype data, researchers have combined computer vision, the Internet of Things (IoT), machine learning, artificial intelligence algorithms, and data mining techniques. This allowed for the automatic identification of plant colors, sizes, shapes, and textures as well as the extraction of interesting features. However, future research must address a number of obstacles, such as how to develop a method for characterizing plant details in their natural environment. Stringently talking, AI is certainly not another innovation by any means. Although machine learning was not yet a concept, Linear Discriminant Analysis (LDA) was proposed by in 1936. Several advanced algorithms, such as Adaptive Boosting (AdaBoost), Support Vector Machines (SVMs), and Convolutional Neural Networks (CNNs), have been developed since machine learning emerged as its own distinct field of study in the 1980s. The Internet of Things has made a lot of data available, necessitating the urgent development of effective nonlinear information processing algorithms for complex data analysis. To address these issues, a growing number of researchers have proposed novel machine learning algorithms. In light of information recovered from the College of California's (UCI) AI vault classified mushrooms as either edible or inedible using adaptive neuro-fuzzy inference systems and artificial neural networks. In addition, we investigated and contrasted the efficacy of various ensemble classifiers, such as boosting, begging, and stacking, with three distinct algorithms: naive Bayes, Ripple-down rule, and Bayes Net. The findings suggested that, in comparison to manual sorting, a machine learning approach could be used to classify data more quickly and accurately. These techniques exhibited the specialized limit and featured a promising application viewpoint of AI based approaches.

Potential Problems and Opportunities Posed by Artificial Intelligence

Combining machine learning algorithms with computer vision systems has also shown promise for resolving a variety of agricultural industry issues. Currently, the combination of deep learning DL and the efficiency of GPUs and Compute Unified Device Architecture (CUDA); an opportunity exists to achieve significant accomplishments through a method that outperforms machine learning algorithms. As indicated by our insight, by a long shot there are no surveys examining the planting and characterization of mushrooms in light of PC vision or AI advancements. This article, in contrast to the preceding literature, focuses primarily on providing up-to-date information on studies examining how computer vision or machine learning technology can be used to grow and differentiate between mushrooms from a general perspective while highlighting the advantages and disadvantages of various methods. Then, the

mushroom industry is used as a context to discuss both the potential problems and opportunities posed by these artificial intelligence methods. The following are reviewed in this paper: i) the relevant ideas in computer vision, ii) the findings of studies that used computer vision and machine learning to find mushrooms in growing beds or sort them, and iii) how new methods like CNN, DL, and Generative Adversarial Networks (GANs) are being used in the mushroom industry. In addition, issues pertaining to the use of automated mushroom harvesting are discussed, as are potential research directions in this field.