Opinion

Modern Technologies for Precision Agriculture and Biodiversity

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The use of drones, machine learning, computer vision, and edge AI systems in precision agriculture and biodiversity has the potential to provide many benefits in the future. These technologies help to acquire, rectify and analyze data from sensors, cameras, and other sources to provide valuable insights and support decision-making. In recent years, drones have become an increasingly important tool in precision agriculture. Drones are small, remotely controlled aircraft that can collect detailed information about crops, fields, and other aspects of agricultural land. Precision agriculture also needs machine learning to analyze large amounts of data collected from sensors, drones, and other sources to make predictions and take actions that can improve crop yields, reduce the use of resources, and support the sustainability of farming operations. Computer vision algorithms can analyze acquired data for detecting and identifying pests and diseases that could affect crop yields. This information can also help to take action to prevent or mitigate these issues, leading to improved crop health and higher profits. One of the key advantages of using drones in precision agriculture is their ability to collect detailed, high-resolution data about crops and fields. Modern RGB cameras have many pixels and a high level of image quality, enabling them to capture fine details and provide valuable data for precision agriculture and other applications. Drones also use multispectral cameras to capture images across various wavelengths, including visible and infrared spectrums. Popular infrared cameras can register other crop parameters and use machine learning algorithms to identify issues such as pests, diseases, or other problems that could affect crop yields, providing valuable information for farmers and other agricultural professionals. This data can aid in identifying areas in the field that need irrigation, fertilization, or other forms of care. By targeting these areas more precisely, farmers can reduce their use of water, fertilizers, and other resources, which can help improve their operations overall sustainability. By using sensors and other technology, drones can provide real-time data about the health of crops, which can be the signal to take action to prevent or mitigate issues that could affect yield. In addition to their potential benefits for agriculture, modern technologies like drones, machine learning, and computer vision can also support biodiversity in several ways, i.e., by monitoring wildlife populations and habitats by behavior recognition and providing valuable data to support conservation efforts. Also, drones can monitor the health of forests, wetlands, and other essential ecosystems, helping to identify areas that require protection or restoration. Modern machine learning uses algorithms and statistical models, and computers can "learn" from data without being explicitly programmed. In recent years, machine learning in precision agriculture has multiplied. One of the critical ways that machine learning can impact precision agriculture is by enabling farmers and other agricultural professionals to make more informed decisions. Data-driven decisions can help reduce water, fertilizers, and other resources and improve crops' overall health and productivity. By analyzing data about weather, soil conditions, and other factors, machine

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learning algorithms can provide insights that can help farmers to optimize their irrigation, fertilization, and other practices. Another potential benefit of machine learning in precision agriculture is its ability to monitor the health of crops and identify potential problems.

Machine learning algorithms can provide real-time data about the health of crops. In addition to its potential benefits for agriculture, machine learning can support biodiversity in several ways. Technology can provide valuable information, support conservation efforts, and monitor and protect endangered species. Machine learning can also help to analyze data about forests, wetlands, and other essential ecosystems, helping to identify areas that require protection or restoration. By automatically analyzing data from sensors, cameras, and other sources, modern algorithms can help assess the impact of different farming practices on crops, soils, water, and other resources. Such information often helps to identify the most effective and sustainable practices, leading to improved crop yields and reduced resource use. It can also help to analyze data to monitor the health of soils and water sources and provide valuable information applicable to optimize irrigation and fertilization practices, leading to more sustainable farming operations. Using drones, machine learning, and computer vision in precision agriculture and biodiversity has vast potential. It can provide many benefits, including improved crop yields, reduced resource use, and better protection of natural habitats. While there are still challenges and limitations to using drones, machine learning, or computer vision in these fields, it is clear that it will continue to play a growing role in supporting sustainable agriculture and conservation efforts in the future.