Artificial intelligence and computer vision in the food industry

J. The Aviraj[1], K. Uday Pavan[1], D. Mahidhar[1], I. Bala Venkata Rama sai[1], P. Thivya[1]

[1]Department of Food Technology, Kalasalingam Academy of Research and Education (KARE), Krishnankovil, Virudhunagar, Tamilnadu, India-626126

Introduction

These days, the world makes a lot of assumptions about food production and the factors that influence commodity markets in the supply and demand chain. These insights raise serious concerns about humanity's ability to meet such food demands and the sustainability of feeding a growing population. One way he thinks about this issue is to: ask questions like Is it possible to address this situation without further depleting the world's resources and destroying the environment? Many factors come to mind when answering these questions. Problems such as the world's rapidly growing population, gradual increases in income levels in developing countries, global warming, and other environmental disasters that mankind has caused over the decades. In particular, the growing demand for food requires equal production values and sustainable methods. Given the population growth, the United Nations Food and Agriculture Organization (FAO) has determined that this population could reach around 9.1 billion by 2050. This estimate underscores the need to compensate for his 70% increase in the global food supply, nearly doubling it in developing countries. The term 'malnutrition' – the inability to consume enough food and the degree of food intake insufficient to meet necessary dietary energy needs – remains a problem.

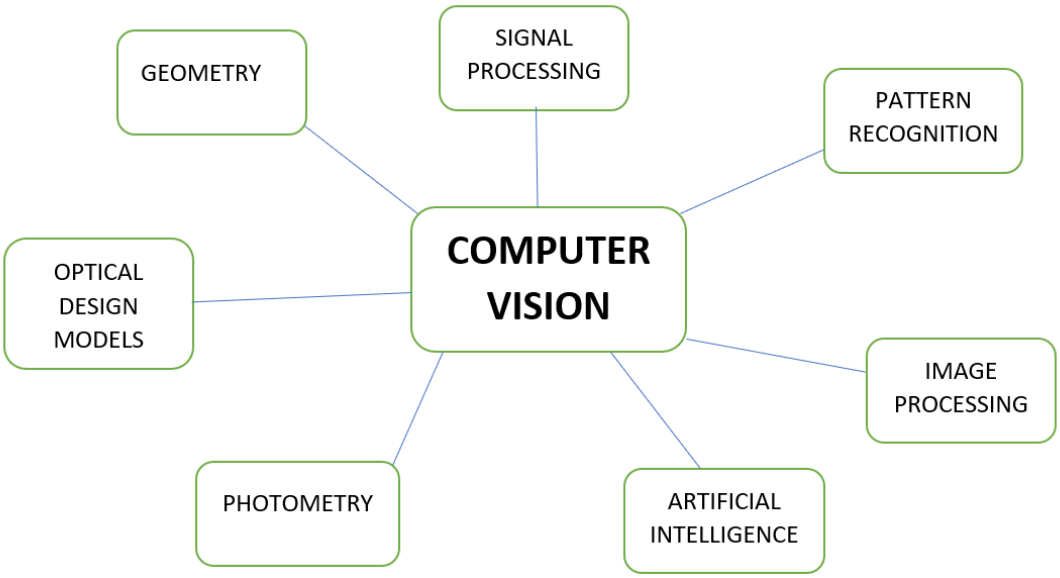
Artificial intelligence revolution

Within decades, manufacturing and modern industry reached peak productivity due to the development of automation. Manufacturing was the first sector, and subsequent technological advances shaped many other industries. At the beginning of the 20th century, the idea that machines would replace human efforts in all areas and perform tasks with greater precision was always a hope for the future. In recent years, artificial intelligence,

scientifically known as AI, has set an impeccable record, replacing humans in tasks such as object recognition and computer vision his task. As learning algorithms and computing power continue to advance, this scenario looks set to take a giant leap. The roots of automation go back to the early 19th century and enabled the industrial revolution that later led to modern technological inventions. Today, automation pervades every industry, and a thriving market is moving beyond expectations. Since 18th-century machines were primarily created to perform simple tasks, such as running, spinning, and repeating, human labor was freed to focus on more complex tasks. From the early 1900s to the present, such automation has only been done a handful of times and has eventually permeated many industries.

Computer vision

In contrast to AI techniques such as neural networks that have been in use since the 1940s, computer vision techniques became important in the late 1960s and early 1970s. It first addresses concepts such as mimicking the human visual system through different understandings of how camera schemes, projections, and photogrammetry work.



Within decades, computer vision has become established in all sorts of fields, including pattern recognition, machine learning, computer graphics, 3D reconstruction, virtual reality, and augmented reality. In 2010, computer vision was able to perform high-end tasks such as object recognition, autonomous vehicle navigation, face recognition, fingerprint recognition, high-speed image processing, and robot navigation. Techniques such as line detection, feature

extraction, segmentation, feature matching and tracking, 3D reality optimization, and reconstruction are opening the door to many amazing inventions such as simultaneous visual localization and mapping (SLAM), object tracking, and more. Clearly illustrates the computer vision discipline taxonomy and related disciplines such as science and technology, mathematics and geometry, and physics and probability. In fact, AI techniques such as machine learning and deep learning require most of them. It can be captured and processed using computer vision techniques.

Food industry

The availability of data related to food and edible products has prompted researchers to use AI lenses to investigate the food sector. By 2015, computers were able to recognize foods from the images they displayed, and by early 2016, AI at the Massachusetts Institute of Technology (MIT) was able to predict the composition and nutritional value of foods displayed. became. The technology took less than a few months to reach the general public as a mobile application. These AI technologies help the food industry to bring their products to market very efficiently through global strategy and food trend planning. Food processing becomes more flexible with machines that can distinguish between the basic problem of apples and oranges and more complex tasks such as low-saturated and unsaturated fats. Clearly shows the food inspection techniques performed for various applications at Stemmer Imaging. Shows the use of deep learning in food classification using the LeNet architecture.

Conclusion

This white paper explores the use of Industrial Revolution 4.0 technologies such as computer vision and artificial intelligence in the fields of agriculture and food processing. In particular, the current review provides a comprehensive understanding of computer vision and intelligence techniques for various agricultural applications, including food processing, agricultural applications, farming, crop data analytics, intelligent irrigation, and next-generation agriculture. In addition, this paper focuses on the basic idea of using four sustainable IR technologies that will allow humanity to achieve the food supply it needs by 2050 in an environmentally friendly manner. The importance of the AgriTech industry and investments based on AI and vision technologies were discussed along with relevant sources

and use cases. AI and computer vision-based start-ups applied to the agro-food industry have been extensively reviewed and offered for a variety of applications. Food and agriculture start-ups, as well as other start-ups such as next-generation farms and animal data, are rarely mentioned in this paper. This review serves as a single window approach to interdisciplinary information using AI and image processing techniques relevant to the food and agriculture sector.