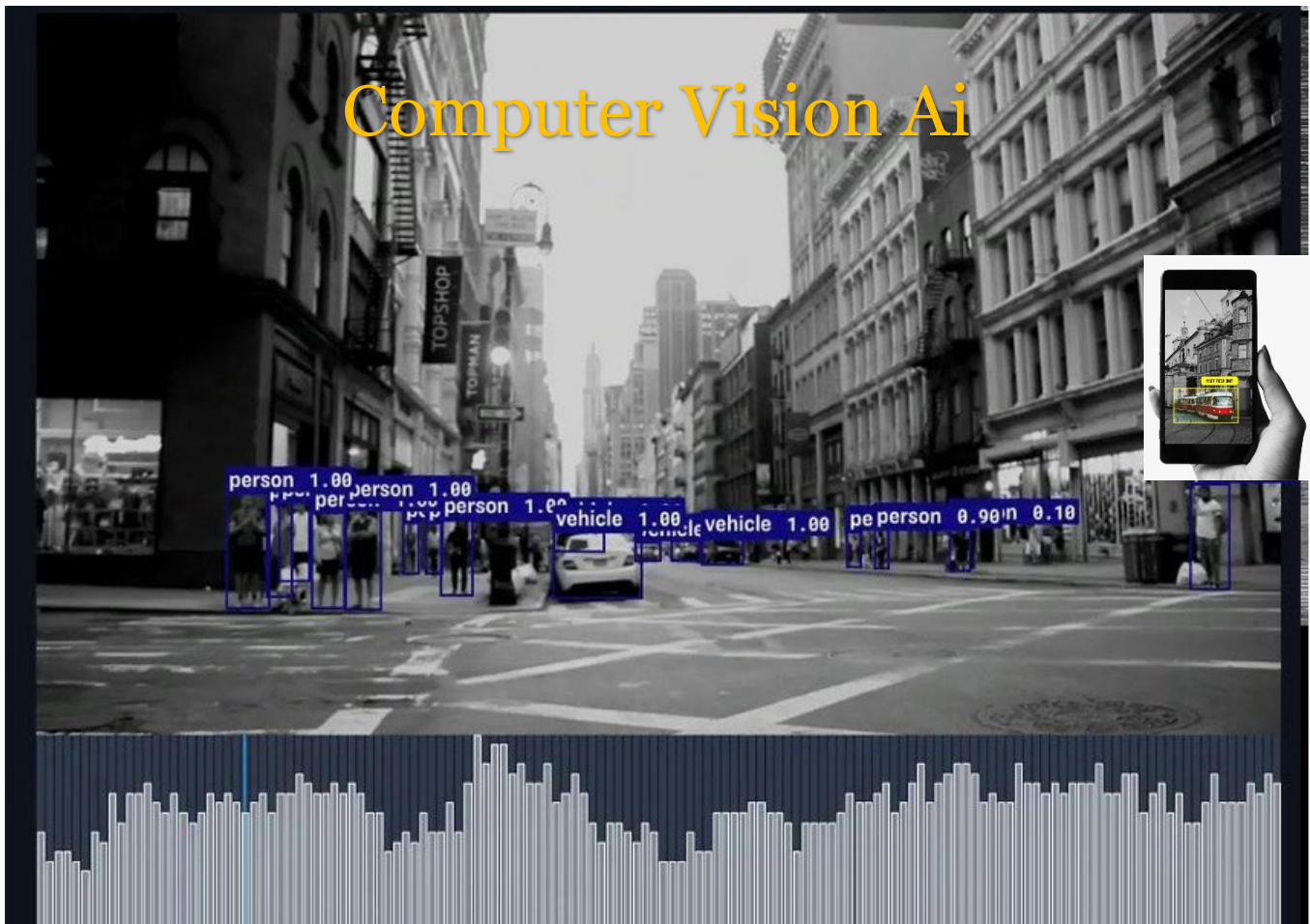




Computer Vision AI enables systems to derive information from digital images, videos, and other visual inputs and take actions or make recommendations based on that information. If AI enables computers to think, computer vision allows them to see, observe and understand.

Computer Vision Ai work the same as human vision, which has the advantage of lifetimes of context to train how to tell objects apart, how far away they are, and whether objects are moving, or something is wrong in an image. Computer vision Ai trains machines with cameras, data, and algorithms to perform these functions. As the system is trained to inspect or watch, a production asset can analyze thousands of products or processes a minute, noticing imperceptible defects or issues by surpassing human capabilities.

How does this work?

1. Deep learning uses algorithmic models that enable a computer to learn about the context of visual data. If enough data is fed through the model, the computer will “look” at the data and teach itself to tell one image from another.

2. A convolutional neural network (CNN) helps the deep learning model by breaking images down into pixels that are given tags or labels. It uses the labels to perform convolutions and predicts what it is “seeing.” The neural network checks the accuracy of its predictions in a series of iterations until the projections come true. CNN first discerns hard edges and simple shapes, then fills in information as it runs iterations of its predictions.
 - a. A CNN is used to understand single images.
 - b. A recurrent neural network (RNN) is used similarly for video applications to help computers understand how pictures in a series of frames are related to one another.

Object classification: Object classification is a computer vision technique/task used to classify an image, such as whether an image contains a dog, a person's face, or a banana. It analyzes the visual content (videos & images) and classifies the object into the defined category. It means that we can accurately predict the class of an object present in an image with image classification.

Object Identification/detection: Object identification or detection uses image classification to identify and locate the objects in an image or video. With such detection and identification technique, the system can count objects in each image or scene and determine their accurate location and labeling. For example, in each image, one dog, one cat, and one duck can be easily detected and classified using the object detection technique.

Object Verification: The system processes videos, finds the objects based on search criteria, and tracks their movement.

Object Landmark Detection: The system defines the key points for the given object in the image data.

Image Segmentation: Image segmentation not only detects the classes in an image as image classification; instead, it classifies each pixel of an image to specify what objects it has. It tries to determine the role of each pixel in the image.

Object Recognition: In this, the system recognizes the object's location with respect to the image.



The global computer vision market is expected to exhibit a CAGR of 7.1% during 2023-2028.

The increasing need for quality inspection that has augmented the demand for vision-guided and smart camera-based robotic systems represents one of the key drivers for the global computer vision market. Furthermore, technological advancements in safety systems, automation and 3D imaging in industries bolstered market growth.

Source: *IMARC Group report published in August 2022.*

Beyond theory. Into reality.

Healthcare: Since the rise of Deep Learning and Machine Learning, healthcare has received many advancements. Some applications include medical image analysis, Diseases detection, characterization, monitoring, Wound care management, Movement analysis, Patient image data processing, and Patient monitoring.

E-commerce & Retail: Computer vision applications in the retail segment let marketers know their customers. Some applications include Cashier less checkout, Personalized shopping, Inventory management, Security and theft prevention, Customer traffic analysis, AR staging for furniture and clothes, and Visual search online.



Robotics and Manufacturing: Computer vision applications help to control quality and maintain the supply chain. Some applications include Package Inspection, Robotic perception systems, Infrastructure monitoring, Predictive maintenance, and Terrain & structural Scanning for construction.

Automotive: For a long time, the automobile industry has been working on automated vehicle classification systems. Technology has progressed and has become more affordable. In the automotive industry, the following computer vision applications are Lane tracking, Vehicle Detection, Traffic Sign Detection and Pathfinder.

Agriculture: In smart farming, computer vision applications have proven their prowess by helping agritech companies and farmers improve crop yield. Let's look at a few more use cases in precision agriculture where computer vision application is aggravating profoundly- Defect Identification, Solar Panel Inspection, Livestock monitoring and Property monitoring and inspection with satellite imagery.

Consumer and Media: AI allows media companies to streamline content-related workflows. This involves automating processes and image recognition, helping with decision-making, or personalizing the customer experience. Sports events analytics, Video Production and Editing, Facial recognition of celebrities, Social media “filters” and other AR applications, Emotion inference, Movie trailer recommendations, Movie thumbnail retrievals, Brand tagging for product exposure analytics.

Future of Ai

Computer vision has a promising future in the high adoption rate of mobile devices, which also involves augmented and virtual reality options as a critical driver of market growth. With that, IoT (Internet of Things) also influences computer vision, which is crucial. Furthermore, the demanding increase of image and video analysis applications, adoption of artificial intelligence, and increased usage of electronic devices by consumers equipped with visionary sensors are driving the global computer vision market substantially with the expectation to prosper in the forecast period.



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