

Abstract: Artificial Intelligence (AI) and Machine Learning (ML) have fundamentally transformed computer vision (CV), enabling machines to extract meaningful information from images and videos with unprecedented accuracy. This paper provides a comprehensive review of the evolution of AI/ML in CV, from early feature-based methods using classifiers such as Support Vector Machines to modern deep learning approaches driven by Convolutional Neural Networks, which enable automatic feature extraction and superior performance in tasks like object detection and image classification. The study also explores recent advances, including vision transformers, generative models for image synthesis and augmentation, and multimodal learning that integrates visual data with other modalities. Drawing on diverse applications—such as medical imaging, autonomous systems, content-based retrieval, and behavioral analysis—the paper highlights key breakthroughs, ongoing challenges, and emerging trends. Critical issues, including interpretability, data efficiency, algorithmic bias, and real-time processing constraints, are examined. The review concludes that AI/ML has not only enhanced but redefined computer vision, enabling advanced perception, understanding, and generation of visual content across scientific, industrial, and societal domains.

Keywords: Artificial Intelligence, Machine Learning, Computer Vision, Deep Learning, Convolutional Neural Networks, Object Detection, Image Segmentation, Generative Models, Explainable AI.