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Techniques and Applications for Deep Learning: A Review

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ABSTRACT

Deep learning is a branch of machine learning that focuses on the development and refinement of complex neural networks for data analysis, prediction, and decision-making. Deep learning models use numerous layers of artificial neurons to automatically extract important features from raw data, making them superior at many tasks to typical machine learning models. Deep learning models' success in these fields has enhanced state-of-the-art performance and created new research and application prospects. Deep learning has been popular due to its capacity to tackle complicated issues in computer vision, natural language processing, speech recognition, and decision-making. In this study, we discuss deep learning techniques and applications, including recurrent neural networks, long short-term memory, convolutional neural networks, generative adversarial networks, and autoencoders. We also demonstrate deep learning's use in various fields. Deep learning has transformed artificial intelligence by enabling computers to learn from enormous datasets and accomplish complex tasks. As a result, scientists and engineers in fields as diverse as medicine, farming, manufacturing, and transportation have increased their focus on developing deep-learning methods and software. Current research trends and potential future paths in deep learning are also highlighted.

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1. Introduction

Artificial intelligence (AI) which is the process of making machines as intelligent as the human brain, is when a machine can carry out tasks that people typically associate with human minds, such as learning and problem-solving. Machine learning is a subset of AI and deep Learning is the subfield of machine learning that focuses on the creation and education of artificial neural networks. With the advent of deep learning techniques, it is now possible for computers to learn from large datasets and make highly accurate predictions or decisions [1] Convolutional neural networks (CNNs) are widely used in deep learning for image recognition and computer vision applications. CNNs are commonly used for tasks like object detection, image classification, and facial recognition because of their ability to recognize patterns and features within images. Recurrent neural networks (RNNs) are another useful method; they

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