

Introduction

February 18, 2025

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    Deep Learning -->  
  
    Deep learning is a subset of machine learning, which is itself a part  
    of artificial intelligence (AI). It focuses on using neural networks  
    with many layers (hence "deep") to model complex patterns in data.  
    These models learn from large amounts of data and are particularly  
    effective in tasks such as image and speech recognition, natural language  
    processing, and more.  
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    Key Components -->  
  
    Neural Networks: The foundation of deep learning, consisting of layers  
    of nodes (neurons) connected to each other. Each connection has a weight  
    that is adjusted during training.  
  
    Activation Functions: These functions help determine the output of a  
    neural network. Common examples include ReLU (Rectified Linear Unit),  
    Sigmoid, and Tanh.  
  
    Backpropagation: A technique used to optimize the weights in the network  
    by calculating the gradient of the loss function and updating the weights  
    to minimize the loss.  
  
    Loss Functions: These quantify how well the network is performing, such as  
    Mean Squared Error (MSE) for regression tasks or Cross-Entropy Loss for  
    classification.  
  
    Optimization Algorithms: Methods like Gradient Descent, Adam, and RMSprop  
    are used to minimize the loss function by adjusting the weights.  
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    Applications -->  
  
    Computer Vision: For tasks like image classification, object detection,
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and segmentation.

Natural Language Processing (NLP): For text analysis, translation, sentiment analysis, etc.

Reinforcement Learning: Used in decision-making processes, like training agents for gaming or robotics.

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