2.3: Machine Learning vs Deep Learning

Machine Learning Example: Customer Churn Prediction

A real-world application of machine learning for customer churn prediction can be found in telecom companies like Verizon or AT&T. They use algorithms such as Support Vector Machines (SVM) to analyze features like call duration, billing history, and complaints to predict whether a customer is likely to leave. This approach is suitable because it uses clearly labeled data — past customer records with known outcomes — allowing the model to learn the relationship between behaviors and churn risk (Kotu & Deshp...

In contrast, deep learning would not be ideal because it demands massive amounts of data and computational resources, which may not provide significant performance improvement for this structured dataset (Jordan & Mitchell, 2015).

Deep Learning Example: Image Recognition (CNNs)

A real-world application of deep learning in image recognition is in Facebook's automatic photo tagging system. Convolutional Neural Networks (CNNs) are used to detect and recognize faces from millions of images uploaded daily (LeCun, Bengio, & Hinton, 2015). This method is suitable because CNNs can automatically extract complex visual features like edges and shapes without human-defined rules, making them perfect for large, unstructured image data.

Traditional machine learning, however, would struggle with such complex inputs since it requires manual feature extraction and cannot easily interpret raw pixels, making deep learning the superior approach in this context (Goodfellow, Bengio, & Courville, 2016).

References

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