Tutorial on Deep Learning and Applications

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1. Abstract

Nowadays artificial intelligence (AI) has come to the realization through advancement in multidisciplinary research. Big training data and GPU allow us to apply deep learning in industry field. The remarkable progress of machine learning, data mining and information theory algorithm have been showing outstanding results beyond the human ability in some area, such as image recognition, speech recognition. In this study, we present the background and some historical context of artificial intelligence so far. And then we introduce the trend of deep learning and its application. Especially convolutional neural networks (CNN) [1], recurrent neural networks (RNN) [2], generative model and multimodal learning which lead the latest trend are explained in detail. Lastly, we discuss the future direction of deep learning and a breakthrough in third AI winter.

2. Introduction

Human beings have wanted to create a thing that has intelligence for a long time. Because they want a skilled labor force without payment of wage and dream an immortal and almighty attendant. Finally, these motives get results in the name of 'Artificial Intelligence' (AI). However, AI treated as a science fiction in early stage 1950s. Machine learning was the breakthrough in stalled AI winter through provide multidisciplinary skill such as statistics, mathematics, computer science, data mining and information theory for realizing artificial intelligence. For several decades, machine learning has made remarkable development and deep learning far outstands machine learning at present.

3. Machine learning and deep learning

At first, we introduce the background of AI then narrow scope, present definition of machine learning and deep learning. Secondly, representative algorithms of each field are described such as CNN, RNN, deep generative model [4,5], etc. Then we show the examples that how to apply theoretical algorithms to real world application. Lastly, we discuss the future direction of deep learning and a breakthrough in third AI winter

Reference

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