

Introduction of Deep Learning

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Abstract

Deep Learning is a new area of Machine Learning research, which has been introduced with the objective of moving Machine Learning closer to one of its original goals: Artificial Intelligence.

In the recent years, deep learning becomes increasingly important to both industries and researches. Facebook and other companies, including Google, IBM, and Microsoft, have moved quickly to get into this area in the past few years because deep learning is far better than previous AI techniques at getting computers to pick up skills that challenge machines, like understanding photos.

For instance, in computer vision area, computers have always had trouble identifying objects in real images so it is not hard to believe that the computers have always performed poorly compared to humans. But all that changed in 2012 when a team from the University of Toronto in Canada entered an algorithm called SuperVision, which swept the floor with the opposition. SuperVision beats all the existing computer vision technologies on object recognition on ImageNet challenge with a large margin, which is a remarkable momentum to indicate the revolution of artificial intelligence.

In this tutorial, I will briefly present the introduction about deep learning, starting from mathematical derivation of basic neural network. Afterwards, I will focus most on describing architecture of convolutional neural network (conv, pooling, LCN, etc.), including some technical and implantation details. In the last step, I will cover applications of Deep models in ImageNet challenge (AlexNet), and briefly describe some mainstream deep learning libraries.