PART V

Introducing Deep Learning

CHAPTER 27

What Is Deep Learning?

Deep learning is a class of machine learning algorithms called neural networks. Neural networks are mathematical models inspired by the structure of the brain. Deep learning enables the neural network algorithm to perform very well in building prediction models around complex problems such as computer vision and language modeling. Self-driving cars and automatic speech translation, to mention just a few, are examples of technologies that have resulted from advances in deep learning.

The Representation Challenge

Learning is a non-trivial task. The brain's ability to learn complex tasks is not yet fully understood by research communities in neurological science, psychology, and other brain-related fields. What we consider trivial, and to some others natural, are a system of complex and intricate processes that have set us apart from other life forms as intelligent beings.

Examples of complex tasks performed by the human brain include the ability to recognize faces at a millionth of a second (probably much faster), the uncanny aptitude for learning and understanding deep linguistic representations, and forming symbols for intelligent communications. Also, the adept skills to compose and perform masterful musical pieces are examples of the marvel of natural intelligence.

The challenge of AI research and engineering is to build machines that can understand and decompose the structural patterns inherent in complex problems in order to mimic natural intelligence. Deep learning as an AI technique approaches the representation problem by learning the underlying fundamental structure inherent in the dataset. Deep learning is also called representation learning.

E. Bisong, *Building Machine Learning and Deep Learning Models on Google Cloud Platform*,
https://doi.org/10.1007/978-1-4842-4470-8_27