

Part III

Deep Learning Research

This part of the book describes the more ambitious and advanced approaches to deep learning, currently pursued by the research community.

In the previous parts of the book, we have shown how to solve supervised learning problems—how to learn to map one vector to another, given enough examples of the mapping.

Not all problems we might want to solve fall into this category. We may wish to generate new examples, or determine how likely some point is, or handle missing values and take advantage of a large set of unlabeled examples or examples from related tasks. Many deep learning algorithms have been designed to tackle such unsupervised learning problems, but none have truly solved the problem in the same way that deep learning has largely solved the supervised learning problem for a wide variety of tasks. In this part of the book, we describe the existing approaches to unsupervised learning and some of the popular thought about how we can make progress in this field.

Another shortcoming of the current state of the art for industrial applications is that our learning algorithms require large amounts of supervised data to achieve good accuracy. In this part of the book, we discuss some of the speculative approaches to reducing the amount of labeled data necessary for existing models to work well.

This section is the most important for a researcher—someone who wants to understand the breadth of perspectives that have been brought to the field of deep learning, and push the field forward towards true artificial intelligence.