PART

FURTHER TOPICS

5

Part 5 is devoted to introducing various advanced topics in machine learning.

In Chapter 30, methods of *ensemble learning* are introduced, which are aimed at combining multiple *weak* learning algorithms to produce a *strong* learning algorithm. In Chapter 31, methods of *online learning* are introduced, which provide computationally efficient means to learn from training data given sequentially. In Chapter 32, methods to estimate the *confidence of prediction* are introduced.

Then various techniques for improving the performance of supervised learning based on *side information* are discussed. In Chapter 33, the framework of *semisupervised learning* is discussed, which tries to make use of additional input-only samples. This chapter also includes methods of *transfer learning*, which are aimed at utilizing training data of other related learning tasks. In Chapter 34, methods of *multitask learning* are introduced, which solve multiple related learning tasks simultaneously by sharing common information.

In Chapter 35, methods of *dimensionality reduction* are introduced for extracting useful low-dimensional feature representations, covering linear supervised and unsupervised methods. Then Chapter 36 focuses on non-linear dimensionality reduction methods.

Finally, various unsupervised learning methods are covered. In Chapter 37, methods of *clustering* are introduced, which are aimed at grouping data samples based on their similarity. In Chapter 38, methods of *outlier detection* are introduced, which try to identify anomalous samples in a given data set. In Chapter 39, methods of *change detection* between data sets are introduced.