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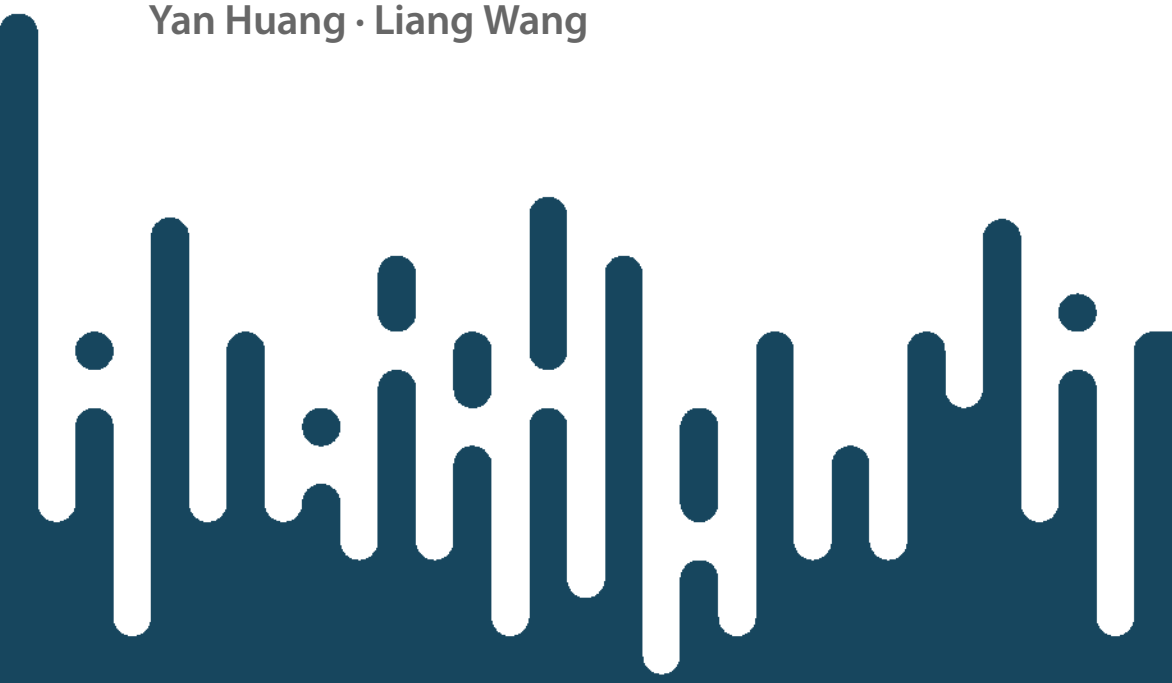

Deep Cognitive Networks

Enhance Deep Learning by Modeling Human Cognitive Mechanism

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Preface

Although deep learning models have achieved great progress recently, there still exists a large performance gap between deep learning models and the human cognitive system. Many researchers argue that one of the major reasons accounting for the performance gap is that deep learning models and the human cognitive system process external information in very different ways.

To mimic the performance gap, since 2014, there has been a trend to model various cognitive mechanisms in human brains, e.g., attention and memory, based on deep learning models. This book unifies these new kinds of deep learning models and calls them Deep Cognitive Networks (DCNs), which can implement various cognitive functions, e.g., selective extraction and knowledge reuse, for more effective information processing.

This book first collects existing theories and evidences about cognitive mechanism modeling from cognitive psychology and proposes a general framework of DCNs that jointly models multiple cognitive mechanisms. Then, it analyzes related works of DCNs and focuses primarily, but not exclusively, on the taxonomy of four key cognitive mechanisms (i.e., attention, memory, reasoning, and decision). At last, it summarizes the recent progress and discusses open problems and future trends.

We hope that this book provides a useful reference toward DCNs for researchers, practitioners, and students working on related areas.

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Yan Huang

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