Probabilistic Models of the Brain: Perception and Neural Function

By -

MIT Press Ltd, United States, 2014. Paperback. Book Condition: New. 254 x 203 mm. Language: English . Brand New Book. Neurophysiological, neuroanatomical, and brain imaging studies have helped to shed light on how the brain transforms raw sensory information into a form that is useful for goal-directed behavior. A fundamental question that is seldom addressed by these studies, however, is why the brain uses the types of representations it does and what evolutionary advantage, if any, these representations confer. It is difficult to address such questions directly via animal experiments. A promising alternative is to use probabilistic principles such as maximum likelihood and Bayesian inference to derive models of brain function. This book surveys some of the current probabilistic approaches to modeling and understanding brain function. Although most of the examples focus on vision, many of the models and techniques are applicable to other modalities as well. The book presents top-down computational models as well as bottom-up neurally motivated models of brain function. The topics covered include Bayesian and information-theoretic models of perception, probabilistic theories of neural coding and spike timing, computational models of lateral and cortico-cortical feedback connections, and the development of receptive field properties from natural signals.

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