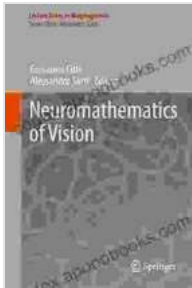# Neuromathematics of Vision: Lecture Notes in Morphogenesis

Neuromathematics of Vision (Lecture Notes in Morphogenesis) by Benjamin Hulme-Cross

★★★★★ 5 out of 5

Language : English
File size : 35363 KB
Screen Reader : Supported
Print length : 385 pages

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Neuromathematics is a rapidly growing field that uses mathematical models to understand the development and function of the nervous system. This book provides an overview of the latest advances in neuromathematics, with a focus on the application of mathematical models to understand the development and function of the visual system.

The book is divided into two parts. The first part covers the basic principles of neuromathematics, including the use of differential equations, partial differential equations, and stochastic processes to model neural systems. The second part of the book applies these principles to specific problems in vision, including the development of the visual cortex, the perception of motion, and the recognition of objects.

Part I: Basic Principles of Neuromathematics

The first part of the book covers the basic principles of neuromathematics, including the use of differential equations, partial differential equations, and

stochastic processes to model neural systems.

Differential Equations

Differential equations are used to model the dynamics of neural systems. These equations describe how the state of a neural system changes over time. For example, a differential equation can be used to model the firing rate of a neuron as a function of its input.

Partial Differential Equations

Partial differential equations are used to model the dynamics of neural systems that are distributed over space. These equations describe how the state of a neural system changes over time and space. For example, a partial differential equation can be used to model the propagation of a wave of activity through a neural network.

Stochastic Processes

Stochastic processes are used to model the effects of noise on neural systems. These processes describe how the state of a neural system changes over time in a random manner. For example, a stochastic process can be used to model the fluctuations in the firing rate of a neuron.

Part II: Applications to Vision

The second part of the book applies the principles of neuromathematics to specific problems in vision, including the development of the visual cortex, the perception of motion, and the recognition of objects.

Development of the Visual Cortex

The visual cortex is a region of the brain that is responsible for processing visual information. The development of the visual cortex is a complex process that begins in utero and continues through adolescence. Neuromathematical models have been used to understand the mechanisms that underlie the development of the visual cortex.

Perception of Motion

Motion perception is the ability to perceive the movement of objects. Neuromathematical models have been used to understand the mechanisms that underlie motion perception. These models have shown that the motion of objects is represented in the brain in a way that is consistent with the principles of physics.

Recognition of Objects

Object recognition is the ability to identify objects in the environment. Neuromathematical models have been used to understand the mechanisms that underlie object recognition. These models have shown that the recognition of objects is a complex process that involves multiple stages of processing.

This book provides an overview of the latest advances in neuromathematics, with a focus on the application of mathematical models to understand the development and function of the visual system. The book is a valuable resource for researchers and students in the fields of neuroscience, mathematics, and computer science.
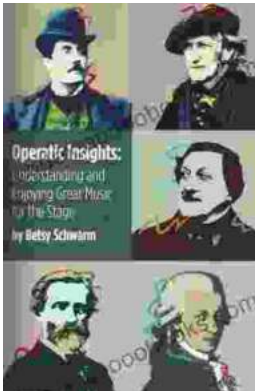
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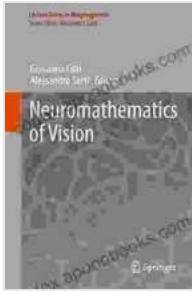
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