Bayesian Modeling of Memory and Perception

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Abstract

I present a framework for modeling memory, retrieval, and perception, and their interactions. The models are inspired by Bayesian induction to determine optimal decisions, in the face of a memory system with inherently noisy storage and retrieval. The starting point for this work was the Retrieving Effectively from Memory (REM) model for episodic recognition (Shiffrin & Steyvers, 1997). The general framework describes: 1) the storage of episodic traces, the accumulation of these into knowledge (e.g. lexical/semantic traces in the case of words), and the changes in knowledge caused by learning; 2) the retrieval of information from episodic memory and general knowledge; 3) decisions concerning storage, retrieval and responding. I give examples of applications to episodic recognition, and cued and free recall, perceptual identification (naming, yes-no and forced choice), lexical decision, and long-term and short-term priming, and briefly consider extensions to episodic categorization and retrieval of content from general knowledge.