Properties of Hierarchical Bayesian Models

Hierarchies

Importance of the Bayesian modelling
Bikram De
"Hierarchical Bayesian models (HBMs) [2] address this problem of hypothesis spaces and priors by positing not just a single level of hypotheses to explain the data but multiple levels: hypothesis spaces of hypothesis spaces, with priors on priors. Each level of HBM generates a probability distribution on variables at the level below."

Learning "efficiency"

Strong Generalizations from Limited Data
Neel Kurupassery
"The paper explores the inferences made by the human brain, specifically in regards to the learning based on a few instances [1]. This includes the way categorization is performed by children with solely a few instances. Tenenbaum also references this ability within adults in completely novel circumstances. While the typicality effects as seen in Palmeri are influential in categorization [2], the discussion seems to focus on the ability to categorize through inferential connections itself."

How do we learn how to learn?
Derek Gloudemans
"...it is unlikely that human cognition computes such Bayesian probabilities for decision-making, and an additional level of Bayesian reasoning in HBMs makes this even less likely the case. Thus, I'm not sure that HBMs provide an extremely accurate or realistic model of human learning of the structure of data. I think they're moving in the right direction though."

Properties of Hierarchical Bayesian Models

Abstract knowledge

Empirical mind vs rational mind
Ali Ozdagli
"It seems that our ability to create abstract knowledge comes from our ability to form constrains based on prior examples. This constraint can be represented in a tree-like hierarchy – perhaps, an innate mental map that we have in our brains due to our tendency to instinctively rationalize the experience. It is an insane idea; a probabilistic mental map that has abstract knowledge representation - we are accurate probability calculators!"

Interesting speculation

"The Mind is a Computer": The Metaphor Underlying Current Approaches to Modeling Human Cognition
Gabriela Gresenz
"It seems that scientific progress can be a clue to answering the cognitive questions posed in this paper by viewing fields of science in terms of a human lifetime: the early stages of a field correspond to childhood and progressions in a field correspond to a human's acquisition of age, and thus experience and knowledge."

The Problem of Emotion in Bayesian Cognitive Models
Caleb Vatral
"Bayesian cognitive models offer an extremely compelling explanation of human knowledge representation and learning. However, there is currently a significant limitation to the models: emotion. "

Interesting speculation

Error-back propagation in the Hierarchical Bayesian Model
James Raubenheimer
"The graph schema and flexibility of Hierarchical Bayesian models are properties which allow error-back propagation to greatly enhance these models. Questions though need to be asked about the biological capability of using error-back propagation in such models." (and under Hierarchies)

Dyadic Acquisition of Survey Knowledge in a Shared Virtual Environment
Soumyajit Chakraborty
"How the migratory birds fly each year from colder places to warmer places? How do they not forget their route? This is because, some of the birds who are acting as the leader of the flocks, have a greater 'survey knowledge' about the ultimate destination where they want to go ultimately. Now using this knowledge, they try to draw a route from the starting point to the endpoint. As they fly, they always try to check whether they are flying in the right direction or not which means they are calculating a probability of an accurate route every time."

The Hierarchical Bayesian Model is Game-Changing
Evan Segaul
"In the assigned reading this week by Joshua Tenenbaum, he and his co-writers propose a method by which one can bridge the gap between "the computation level [that] characterizes the problem that a cognitive system solves" and "the algorithmic level [that] describes the procedures executed to produce this solution" in the context of learned, abstract thinking."