

A rational model of function learning

Christopher Lucas
UC Berkeley

Thomas Griffiths
UC Berkeley

Michael Kalish
University of Lafayette

Abstract: People often face the problem of learning what value a variable will take, given information about the values of other variables. Categorization and causal prediction are special cases, each the subject of extensive research dealing exclusively with discrete variables. With continuous variables, this problem is known as function learning. Most function learning research has been concerned with specifying representations and processes by which people understand the functional relationship between pairs of continuous variables. In contrast, we present a rational model that transparently identifies the inductive biases that a process model should seek to capture. The foundation of our approach is an infinite mixture of Gaussian process experts. It extends our previous Gaussian process model, which outperforms several well-known alternatives and has been shown to be a generalization of both associative and rule-based (i.e., regression-like) function-learning models. We find that it explains several phenomena, including knowledge partitioning and iterated learning data.