

MATEMATISKA INSTITUTIONEN
STOCKHOLMS UNIVERSITET
Avd. Matematik

SJÄLVSTÄNDIGT ARBETE I MATEMATIK

Torsdagen den 21 mars kl. 11.00–12.00 presenterar Tom Everitt sitt arbete “Universal Induction and Optimisation: No Free Lunch?” (30 högskolepoäng, avancerad nivå).

Handledare: Tor Lattimore, Peter Sunehag och Marcus Hutter

Plats: Sal 35, hus 5, Kräftriket

Sammanfattning: Inductive reasoning is the process of making uncertain but justified inferences; often the goal is to infer a general theory from particular observations. Despite being a central problem in both science and philosophy, a formal understanding of induction was long missing. In 1964, substantial progress was made with Solomonoff’s universal induction. Solomonoff formalized Occam’s razor by means of algorithmic information theory, and used this to construct a universal Bayesian prior for sequence prediction. The first part of this thesis gives a comprehensive overview of Solomonoff’s theory of induction.

The optimisation problem of finding the argmax of an unknown function can be approached as an induction problem. However, optimisation differs in important respects from sequence prediction. We adapt universal induction to optimisation, and investigate its performance by putting it against the so-called No Free Lunch (NFL) theorems. The NFL theorems show that under certain conditions, effective optimisation is impossible. We conclude that while universal induction avoids the classical NFL theorems, it does not work nearly as well in optimisation as in sequence prediction.

Alla intresserade är välkomna!