"Forecasting, monitoring, controlling: Dealing with a dynamic world"

UCL 19-20 September 2013

Abstract s

1. Talk: Leonard A. Smith

‘On the Use and Abuse (and rational interpretation) of Probability Forecasts’

Von Neumann prophesied famously that we would learn to predict stable systems and to control those too unstable to predict. The Earth's weather and its climate provide the classic showcases for attempts to forecast, monitor, and indeed control complicated dynamical systems. Consideration of the climate is more complicated than that of the weather, of course, as the climate is evolving in an interesting and somewhat controllable way, while weather can often be considered as merely dynamic.
Prediction, control and indeed monitoring each hinge on the quantification of uncertainty, usually in terms of probability distributions. This paper discusses the various kinds of probability, their role in prediction and control, and the extent to which we have access to those kinds that are of most value. While focusing on actual weather forecasts, seasonal forecasts and climate forecasts, financial probability forecasts of the Bank of England will also be touched on to provide a more complete picture of the challenges of probability forecasting.
Von Neumann also remarked that there is no sense in being precise when you don't even know what you're talking about. There are different kinds of probability, and it is important to know which kind we are talking about. IJ Good noted several kinds of probability. There are also at least two kinds of dealings with a dynamic world: weather-like and climate-like. Rational use of probability forecasts requires access to the right kind of probability for the particular dealing at hand. Absent this, there is no persuasive argument for using "a probability forecast" at all: no rational interpretation of "a probability

2. Talk: Erica L. Thompson and Leonard A. Smith

‘The Hawkmoth Effect in Forecasting, Monitoring and Controlling Complex Dynamic Systems’

The Butterfly Effect is a well-known constraint on the predictability of certain types of nonlinear systems, describing a sensitive dependence on initial conditions such that the "flap of a butterfly's wing" can have profound long term effects on the evolution of the system. Less well known but at least as pernicious is the Hawkmoth Effect, which also constrains predictability of dynamical systems. In this