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GE509

Current Research

The focus of my research is to determine the effect of climate change on hydroelectric generation in the US utilizing monthly generation and climate figures. Currently I am using the EIA 759 and 906/920 data series spanning 1970-1995 and 2000-2012 to provide monthly generation figures in MWh on 954 hydroelectric units(with some corrupted data between 1996 and 1999). The in-sample climate data comes from the GLDAS NOAH model (3 hourly, 1 degree grids). Climate simulations come from various global climate models: CMCC-CM, CNRM-CM5, INM-CM4, MIROC5, and MRI-CGCM3. Climate data pulled from the NOAH model and the GCMs include precipitation, temperature (near surface), BGRUN (baseflow groundwater/ subsurface runoff), SSRUN (storm surface runoff), and TOTRUN (SSRUN+BGRUN). From these variables I hope to obtain a reliable model to relate dams or groups of dams to climate variables.

GE509 Project Proposal

In partnership with Bentley Coffey we have worked out the analytic and graphical solutions to the dam operator problem: maximization of generation subject to constraints and spillage. The form of solution exhibits a step-shape where operators should tend toward extremes of maximum production and minimum production up to the unknown and probably time-varying constraints. However, the operational frequency is likely a much shorter time scale (one day) than the observation period (one month). So the observations are smoothed over many of the (suspected and confirmed in some subsets) operational cycles.

It would be useful for me to examine a subset of my dataset and analyze a small set of dams for this behavior.

I am therefore setting out to obtain high-frequency generation and price data for a subset of my dams in order to develop a high-frequency model with which to bootstrap a low-frequency model.

This week I will seek high-frequency generation/price data for either the Salt-River dams or the lower-Columbia.

Models

At this point I plan on using an HMM model or mixture model though I do not yet have all the details worked out. In particular I plan on uses prices and climate variables to explain latent states, with generation as the dependent variable.