CEE7430 Homework 9: Nonparametric Model

Due: 4/21/09

Reading:

Sharma, A., D. G. Tarboton and U. Lall, (1997), "Streamflow Simulation: A Nonparametric Approach," *Water Resources Research*, 33(2): 291-308, http://www.agu.org/pubs/crossref/1998/97WR02429.shtml.

1. Implement the NP1 model described in Sharma et al. (1997) for annual flow in the Colorado at Lees Ferry. Evaluate simulations from the model using the same suite of test statistics used in homework 7, question 5. Compare your results to the best model from homework 7, question 5 and comment on differences.

Suggested steps

   a. Estimate λ from equation (12).
   b. For h in the range 0.25λ to 1.1λ plot LSCV(**H**) from equation (15) using $\mathbf{H} = h^2\mathbf{S}$. Report the h that minimizes LSCV(**H**). (Note that I have used the notation $\mathbf{H} = h^2\mathbf{S}$ rather than equation (7) to avoid the notational ambiguity in the paper between in λ equations (7) and (12).) The "parameters" of the model consist of the **S** matrix and h, in addition to the historic data.

   Simulation

   c. Simulate X_t for the first year by picking x_{i-1} at random from all values (each with probability 1/n) and applying equation (23).
   d. Given a simulated X_{t-1} estimate for each historical value x_i the w_i from equation (21a) , **S'** from equation (21b) and b_i from equation (21c).
   e. Pick one of these at random with probability w_i then simulate X_t from equation (22).
   f. Repeat steps d and e until a realization of the desired length has been generated.