625.664 Computational Statistics

Problem Set 11

Associated Reading: Chapter 10: Introduction - 10.2.2.1, 10.3.1., 10.4 - 10.4.2, 10.4.3.1

Complete the problems either by hand or using the computer and upload your final document to the Blackboard course site. All final submittals are to be in PDF form. Please document any code used to solve the problems and include it with your submission.

1. Problem 10.1 (a) and (b). **Use the F12 data that is posted on the course Blackboard site and not that posted by the authors. Please note that you will have to compute the random variable X since it is the log of the data as given.**
   For part (a), note the following:
   (i) You do not need to use the UCV bandwidth, just the other three.
   (ii) As part of your answer, plot each density estimate and a histogram of the data.
   (iii) When calculating the the Sheather-Jones method bandwidth, use Silverman's Rule of thumb as your pilot h_0 and the Normal kernel for L to estimate $f''(x)$, then plug the result into Equation 10.24 to get the h for your final estimate of f. Do not use Equation 10.28. Also, you can use Monte Carlo Integration to estimate the roughness of $f''(x)$.
   For part (b):
   (i) As part of your answer, plot each density estimate.
   (ii) Use the Silverman's Rule of thumb for the bandwidth developed in part (a).
   (iii) Note that you already found the estimate using the normal kernel in part (a).
   (iv) Note that for all the kernels except the normal kernel, $K(z)$ as defined in Table 10.1 must be multiplied by $I_{\{|z|<1\}}$.
   (v) In addition to finding the kernel estimates, find a histogram estimator using the Silverman's Rule of thumb for the bandwidth.