Statistics 745 Group Assignment 6

September 14, 2010

1. Take derivative to θ_0 and make it to 0, we have

$$\frac{\partial \sum_{i=0}^{n} K_\lambda(x_0, x_i)(y_i - \theta_0)^2}{\partial \theta_0} = 0$$

$$2\sum_{i=0}^{n} K_\lambda(x_0, x_i)(y_i - \theta_0) = 0 \Rightarrow \widehat{\theta}_0 = \frac{\sum_{i=0}^{n} K_\lambda(x_0, x_i) y_i}{\sum_{i=0}^{n} K_\lambda(x_0, x_i)}$$

2. Take partial derivative to θ_0 and θ_1 and make them to 0, we have:

$$\begin{cases} \frac{\partial \sum_{i=0}^{n} K_\lambda(x_0,x_i)(y_i - \theta_0 - \theta_1 x_i)^2}{\partial \theta_0} = 0 \\ \frac{\partial \sum_{i=0}^{n} K_\lambda(x_0,x_i)(y_i - \theta_0 - \theta_1 x_i)^2}{\partial \theta_1} = 0 \end{cases}$$

$$\Rightarrow \begin{cases} \sum_{i=0}^{n} K_\lambda(x_0, x_i)(y_i - \theta_0 - \theta_1 x_i) = 0 \\ \sum_{i=0}^{n} K_\lambda(x_0, x_i) x_i (y_i - \theta_0 - \theta_1 x_i) = 0 \end{cases}$$

$$\Rightarrow \begin{cases} \sum_{i=0}^{n} K_\lambda(x_0, x_i) y_i - \theta_0 \sum_{i=0}^{n} K_\lambda(x_0, x_i) - \theta_1 \sum_{i=0}^{n} K_\lambda(x_0, x_i) x_i = 0 \\ \sum_{i=0}^{n} K_\lambda(x_0, x_i) x_i y_i - \theta_0 \sum_{i=0}^{n} K_\lambda(x_0, x_i) x_i - \theta_1 \sum_{i=0}^{n} K_\lambda(x_0, x_i) x_i^2 = 0 \end{cases}$$

$$\Rightarrow \begin{cases} \widehat{\theta}_1 = \frac{(\sum_{i=0}^{n} K_\lambda(x_0,x_i) y_i)(\sum_{i=0}^{n} K_\lambda(x_0,x_i) x_i) - (\sum_{i=0}^{n} K_\lambda(x_0,x_i) x_i y_i)(\sum_{i=0}^{n} K_\lambda(x_0,x_i))}{(\sum_{i=0}^{n} K_\lambda(x_0,x_i) x_i^2)(\sum_{i=0}^{n} K_\lambda(x_0,x_i)) - (\sum_{i=0}^{n} K_\lambda(x_0,x_i) x_i)^2} \\ \widehat{\theta}_0 = \frac{(\sum_{i=0}^{n} K_\lambda(x_0,x_i) y_i)(\sum_{i=0}^{n} K_\lambda(x_0,x_i) x_i^2) - (\sum_{i=0}^{n} K_\lambda(x_0,x_i) x_i y_i)(\sum_{i=0}^{n} K_\lambda(x_0,x_i) x_i)}{(\sum_{i=0}^{n} K_\lambda(x_0,x_i))(\sum_{i=0}^{n} K_\lambda(x_0,x_i) x_i^2) - (\sum_{i=0}^{n} K_\lambda(x_0,x_i) x_i)^2} \end{cases}$$