Estimating the conditional variance by local linear regression

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Estimating the conditional variance

1.Fit a nonparametric regression to data (x_i, y_i) and save the estimated values $\hat{m}(x_i)$.

2.Transform the estimated residuals $\hat{\epsilon} = y_i - \hat{m}(x_i)$

$$z_i = \log \epsilon_i^2 = log((y_i - \hat{x_i}))^2)$$

3. Fit a nonparametric regression to data (x_i, z_i) and call the estimated function $\hat{q}(x)$. Observe that $\hat{q}(x)$ is an estimate of log $\sigma^2(x)$.

4. Estimate $\sigma^2(x)$ by

$$\hat{\sigma}^2(x) = e^{\hat{q}(x)}$$