Lecture 25

Model Fitting Example

In this lecture, I discuss the steps I used to determine the best model to a large data set. The set consists of the ages and heart rates of 618 children. The data are read from a graph in Rusconi *et al.* 1994 by the authors or assistants to the authors of The Statistical Sleuth. The data form the data from Exercise 24 in Chapter 8, The Statistical Sleuth by Ramsey and Schafer and are available from the WEB site:

http://www.proaxis.com/∼panorama/home.htm

A model fitting example

First: Run the simplest regression possible and look at the output. That is, run the model

$$\text{Heart Rate} = \beta_0 + \beta_1 \text{Age}$$

and look at the residuals against their fits (for heterogeneity of variance), the normality of the residuals, the test for curvature in the fit, outliers, etc...

In this example, we have heterogeneity of variance. Let's try to correct that first (by log-transforming Y) and see what happens to the rest of the issues.

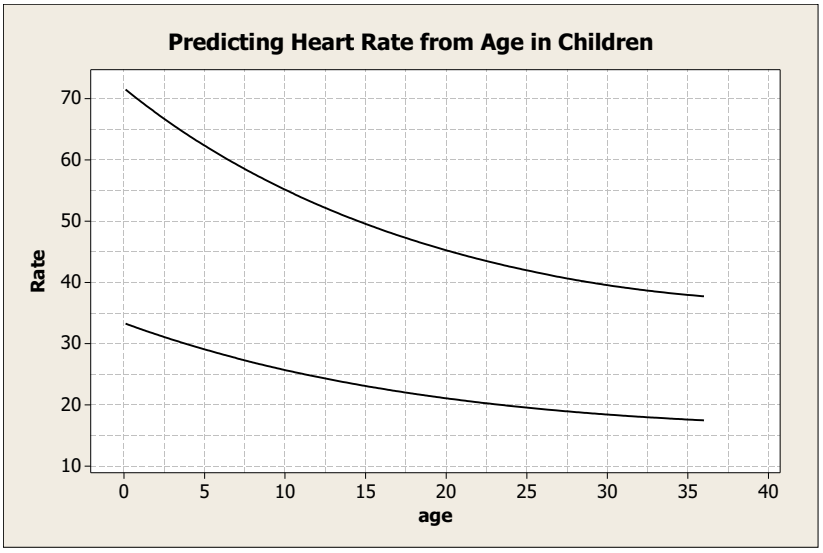
Second: Re-run the regression, store and report everything possible, and look as best as possible at the outcomes. The normality of the residuals is vastly improved. Heterogeneity of variance seems to be improved. But there is still curvature according to Minitab. Can you "see" it?

Third: Try to correct the curvature using an age^2 term. That seems to do the trick.

Fourth: What do we want? A graphic doctors can use to determine whether the heart rate for the child they are testing is abnormal. So we want PREDICTION bands. A graph or table would be good. In my children's pediatrician's office, there is a graph for height and weight. Let's try to get Minitab to produce a nice graph for us. So we:

1. Store the prediction limits
2. Exponentiate them so that they are on the same scale as the original data
3. Plot the exponentiated limits against age using grid lines, nice spacings, getting rid of data points, unwanted legends, changing the legends so they make sense for our purpose, etc...

The final graphic might then be something like:



Exercises for Lecture 25

1. –

2. –