

An MLAB Example: Non-Parametric Regression

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If you have data for which a definite model, *i.e.* a set of mathematical functions, is known, then you can adjust the parameters in that model to fit the data using the *MLAB* fit command; the resulting best-fit model can then be used for descriptive or predictive purposes.

If, on the other hand, a definite model is not known, as may occur for example with economic time series data or other phenomenological data, then some model which reasonably fits the data with any parametric form whatsoever may be useful; such a model is called a *non-parametric* model.

There are a variety of methods for obtaining a non-parametric model for given data. These methods include kernel estimation, polynomial fitting with moving weights, smoothing splines, moving means and moving medians.

All of these methods can be done within *MLAB*. Below we show the moving weighted median and moving weighted mean methods which use the corresponding builtin functions within *MLAB* to produce the non-parametric model curves with associated error bands for the read-in data that is plotted below. Note that the data has multiple points with the same *x*-values, which is easily handled by *MLAB*.

```
* m=read(data,230,2)
* wm=(0:1!15)&(1^15)&(1:0!15)

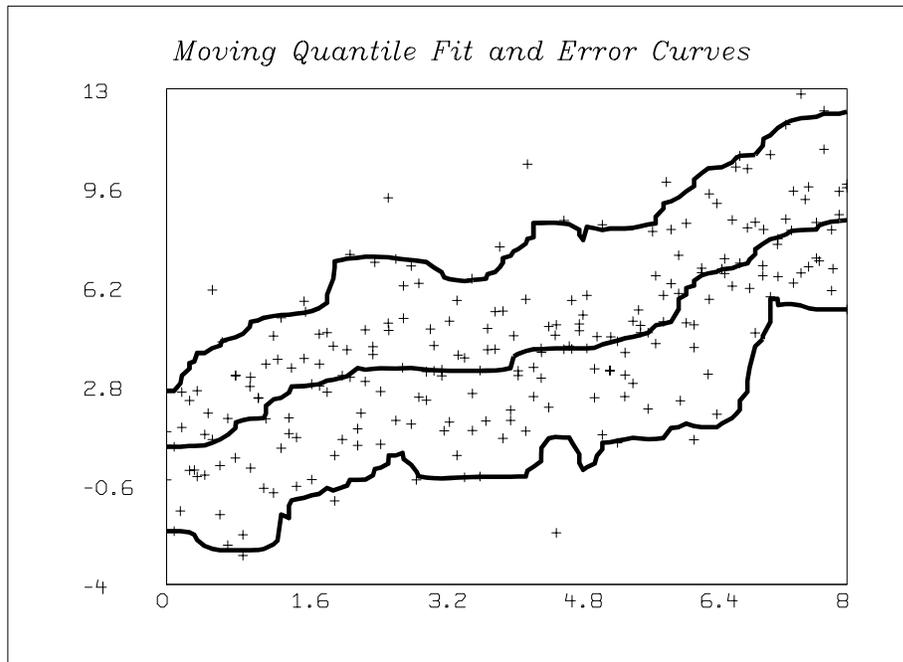
* a=mquantile(m col 2,.5,45,0,4,wm)
* q1=mquantile(m col 2,.05,45,0,4,wm)
* q2=mquantile(m col 2,.95,45,0,4,wm)

* draw m lt none pt crosspt ptsize .01
```

```

* za=(m col 1)&'a&'q1&'q2; za=rdup(za);
* draw za col (1,2) color red lt (1,0,0,0,0,.005,0)
* draw za col (1,3) color brown lt (1,0,0,0,0,.005,0)
* draw za col (1,4) color brown lt (1,0,0,0,0,.005,0)
* top title "Moving Quantile Fit and Error Curves" font 17
* view

```



```

* del w,q1,q2
* a=mmean(m col 2,45,0,4,wm)
* s=mstddev(m col 2,45,0,4,wm)

* draw m lt none pt crosspt ptsize .01
* za=(m col 1)&'a&'s; za=rdup(za); tx = za col 1;
* draw za col (1,2) color red lt (1,0,0,0,0,.005,0)
* draw tx &'((za col 2)+1.96*(za col 3)) color brown lt (1,0,0,0,0,.005,0)
* draw tx &'((za col 2)-1.96*(za col 3)) color brown lt (1,0,0,0,0,.005,0)
* top title "Non-parametric Moving Weighted Mean Fit" font 17
* view

```

Non-parametric Moving Weighted Mean Fit

