Smoothing Part2

Elijah White

This research was different from what I’m usually used to as I was told to investigate into the ways in which smoothing methods might be used. All while keeping the data and preserving its general patterns. To make the data more representative of defects or "salt," was added after a basic linear dataset, y = 2 x + 1 , was first generated. The software then used a moving average smoother to cut down. I ran the smoothing algorithm several times to see what would happen, and then I compared the outcomes to see how the data changed.

As I expected for the function y = 2x+1, the original dataset was a clean, straight line prior to anything else happening. The graph grew out of control a little once the salt was introduced, with unusual departures both above and below the initial line. The data began to revert to the initial trend after the initial smoothing pass restored some order by reducing most of it. The graph smoothed down much more after the second pass, but I began to see that some of the data's features were beginning to fade. The line was starting to become so smoothed out after the time around I’d say it was completely starting to look different from the first time around.

**Dynamic Window Size:** Use larger windows for stable areas and smaller windows for abrupt transitions to allow the smoothing window size to adjust according to data variability. Better trend preservation across a variety of datasets would result from this.   
**Weighted Moving Average:** Use a weighted moving average in which the window's core points are given greater weight. This preserves the fundamental structure of the data set while successfully reducing noise.

**Iterative Thresholding**: Determine an acceptable noise reduction threshold and apply a stopping condition for successive smoothing passes. By doing this, over-smoothing is avoided, and the data's significant features are preserved.

References

<https://www.investopedia.com/ask/answers/071414/whats-difference-between-moving-average-and-weighted-moving-average.asp>

<https://statisticsbyjim.com/time-series/moving-averages-smoothing/>