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Robust regression applied to fractal/multifractal analysis.

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Fractal and multifractal are concepts that have grown increasingly popular in recent years in the soil analysis, along with the development of fractal models. One of the common steps is to calculate the slope of a linear fit commonly using least squares method. This shouldn't be a special problem, however, in many situations using experimental data the researcher has to select the range of scales at which is going to work neglecting the rest of points to achieve the best linearity that in this type of analysis is necessary.

Robust regression is a form of regression analysis designed to circumvent some limitations of traditional parametric and non-parametric methods. In this method we don't have to assume that the outlier point is simply an extreme observation drawn from the tail of a normal distribution not compromising the validity of the regression results.

In this work we have evaluated the capacity of robust regression to select the points in the experimental data used trying to avoid subjective choices. Based on this analysis we have developed a new work methodology that implies two basic steps:

• Evaluation of the improvement of linear fitting when consecutive points are eliminated based on R p-value. In this way we consider the implications of reducing the number of points.
• Evaluation of the significance of slope difference between fitting with the two extremes points and fitted with the available points.

We compare the results applying this methodology and the common used least squares one. The data selected for these comparisons are coming from experimental soil roughness transect and simulated based on middle point displacement method adding tendencies and noise. The results are discussed indicating the advantages and disadvantages of each methodology.

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