

What are Mean Squared Error and Root Mean Squared Error?

JULY 5, 2018

The Mean Squared Error (MSE) is a measure of how close a fitted line is to data points. For every data point, you take the distance vertically from the point to the corresponding y value on the curve fit (the error), and square the value. Then you add up all those values for all data points, and, in the case of a fit with two parameters such as a linear fit, divide by the number of points minus two.** The squaring is done so negative values do not cancel positive values. The smaller the Mean Squared Error, the closer the fit is to the data. The MSE has the units squared of whatever is plotted on the vertical axis.

Another quantity that we calculate is the Root Mean Squared Error (RMSE). It is just the square root of the mean square error. That is probably the most easily interpreted statistic, since it has the same units as the quantity plotted on the vertical axis.

Key point: The RMSE is thus the distance, on average, of a data point from the fitted line, measured along a vertical line.

The RMSE is directly interpretable in terms of measurement units, and so is a better measure of goodness of fit than a correlation coefficient. One can compare the RMSE to observed variation in measurements of a typical point. The two should be similar for a reasonable fit.

**Using the number of points – 2 rather than just the number of points is required to account for the fact that the mean is determined from the data rather than an outside reference. This is a subtlety, but for many experiments, n is large so that the difference is negligible.

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