y-on-x and x-on-y regressions

written by The Coué method on Functor Network
original link: https://functor.network/user/1751/entry/667

OLS regression

The OLS (ordinary least square) regression is described in Simple linear regression model. We'll call this regression the y-on-x regression since we are using a value for x to predict a value for y.

Issues with y-on-x regression

- The regression-to-the-mean phenomenon means that the equation of the y-on-x regression is a biased estimate of the true functional relationship between x and y. Specifically, the the absolute value of the slope of the y-on-x regression is smaller than the absolute value of the slope of the true relationship between x and y.
- The y-on-x regression is not symmetric. Specifically, if you solve x in terms of y in the y-on-x regression, you do not end up with the x-on-y regression.
- If you plot the y-on-x and x-on-y regressions in the same plane, both regression lines go through the data centroid $(\bar{x}, \bar{y})$, but the slope of the x-on-y regression line is greater than or equal to the slope of the y-on-x regression line.

Reference

Simple linear regression model, https://functor.network/user/1751/entry/653