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2. Least squares introduction

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In this lecture, we are going to learn about a topic from statistics known as least-squares interpolation. We present this topic here because the method for solving this problem comes from the methods of unconstrained optimization that you learned earlier in this Unit. Here, the “real-world" function we want to minimize will be the error between a linear fit of our data and the data itself. We will minimize the error by computing when its partial derivatives are all zero.

Introduction to least squares

Start of transcript. Skip to the end.

DENIS AUROUX: What I would like to tell you about now instead

is a nice application of min-max problems that maybe you

don't think of as a min-max problem, but you will see--

because you don't think of it that way because probably

your calculator can do it for you.

Or if not, your computer can do it for you.

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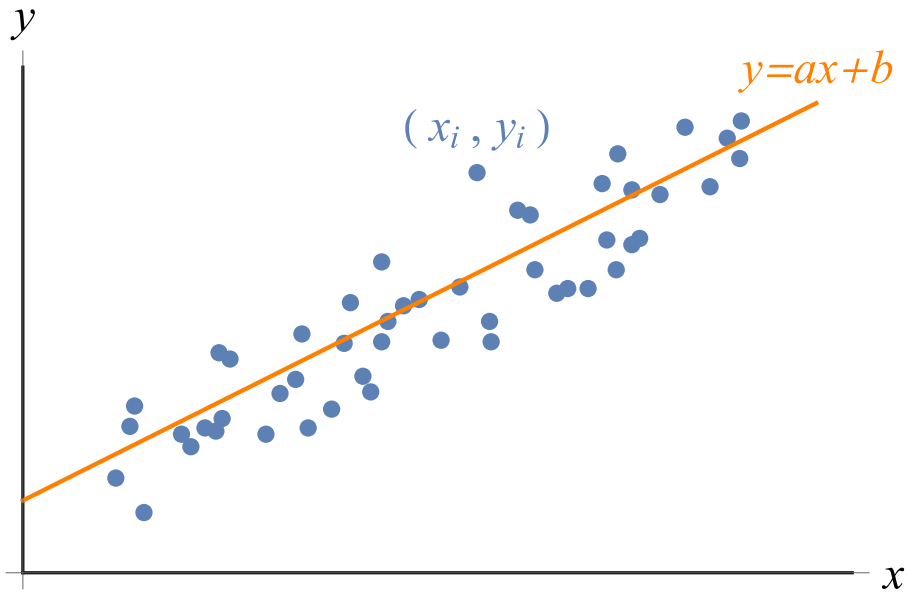
The idea behind "least squares fit" or "least squares interpolation" is to find a mathematical expression that describes a relationship between two variables. If the data points (x_i, y_i) look like they might be following a linear trend, we want to find the constants a and b such that $y = ax + b$ is the "best" fit line that describes the relationship between x and y.



2. Least squares introduction

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Interpolation vs Extrapolation
Prof Auroux refers to Least Squares Interpolation in the lecture, but his problem on iPods is actually **extrapolation** (and a big reas... 2

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