Maximizers and Minimizers 1

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Let A be an m x n matrix

Let b be a vector in IR

Consider the system Ax = b

1. Any solution x to the normal equations (A^T A)z = Ab is a best approximation to Ax = b in the sense that || Az - b || <= ||Ax - b|| for all x in IR
2. If the columns of A are linearly independent then A^T A is invertible and z is the unique solution z = (A^T A)^-1 A^T b

If you have an inconsistent system A

Do A^T A = … (multiply the matrices) = …

The A^T A matrix is symmetric (same if transposed or not)

Do A^T b (multiply A^T by the vector A)

Now do z = (A^T A) A^T b

Augment A^T A with b

A minimizer is the constants from each vector value

BEST FIT LINES

- Minimize the sum of the squares of the errors

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