

Feb 17, 2021

Problem to solve (with input)

$$(A, b) \rightarrow x: Ax = b$$

$$(A, B) \rightarrow C = A \cdot B$$

$(\{\langle \boxed{?}, \text{cat} \rangle\}, \text{NN})$

\rightarrow opt NN weights

Suppose we have great algo
for solving our problem.
Is this enough?

error in input?

$$A + E \text{ instead of } A \quad (A + E)x = b$$

$(\langle \boxed{?}, \text{dog} \rangle, \text{cat})$

Many sources of error in input data

① Measurement error

② Roundoff error

③ Modelling error

④ Approximation error

Perturbations of input change output

A problem + input is

• well-conditioned: small input changes
 \Rightarrow small output "

• ill-conditioned: small input changes
 \Rightarrow large output "

"small" vs. "large" \Rightarrow measure size of error

want x , have \hat{x}

Absolute error: $\|\hat{x} - x\|$

Relative error: $\frac{\|\hat{x} - x\|}{\|x\|}$

$$[f(w)]_i = [Av]_i$$


