

QueryComplexity

• Access to data as maybe restricted for efficiency:

• Query arbitrary entries

• Query matrix-vector products

• Query arbitrary *linear* measurements

A large blue square is centered on a black background. The square has a thin black border. In the center of the blue square, the letter 'A' is written in a black, serif font.

A

(i, j)



$A_{i,j}$



v



Av



u



$u^T A \leftarrow$

$$= \sum_{i,j} S_{i,j} A_{i,j} = \langle \text{vec}(S), \text{vec}(A) \rangle$$

Measure

A

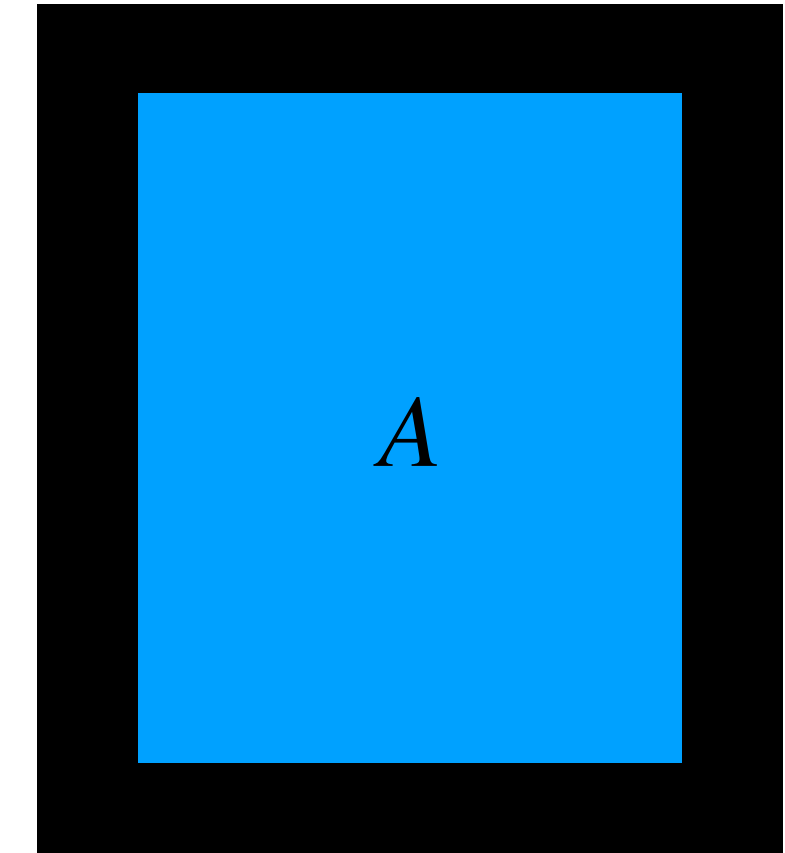
with

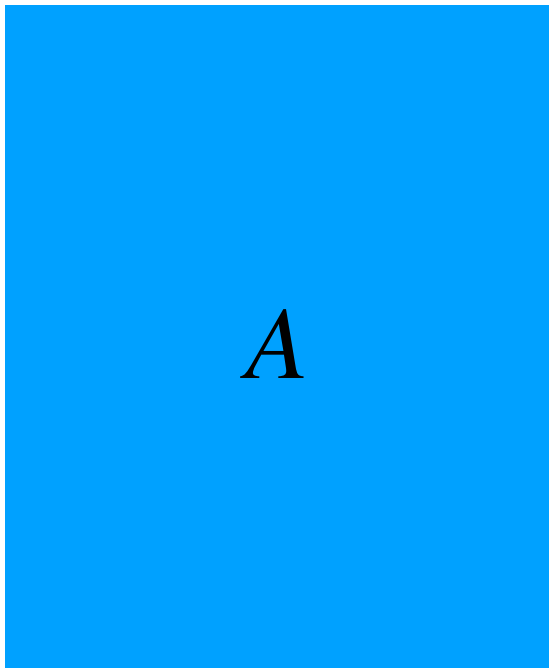
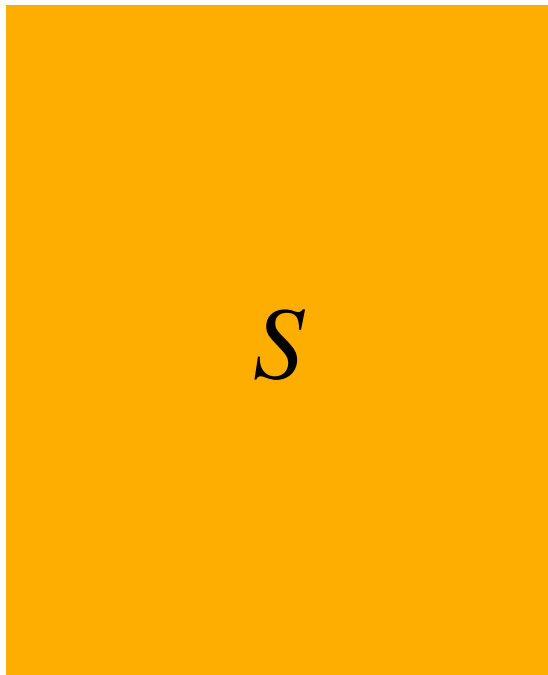
S

• How many queries do we need to solve a problem?

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Measure  with  $= \sum_{i,j} S_{i,j} A_{i,j} = \langle \text{vec}(S), \text{vec}(A) \rangle$

- How many queries do we need to solve a problem?

Space Complexity

- Streaming:
 - Space required by an algorithm to maintain the state while processing the stream