

LinearMeasurementsMatrix-VectorProducts

- If A is $n \times n$, matrix-vector products can be simulated with n linear measurements

- n linear measurements are at least as powerful as one matrix-vector product

Tracked and computed exactly with one linear measurement

- Requires $\Omega(n)$ matrix-vector products for exact trace

• Sun, Wodruff, Yang, Zhang '21 (Triangle detection)

- Requires $\Omega(1/\varepsilon^2)$ for approximating up to $1 \pm \varepsilon$

• Wimmer, Wu, Zhang '14

Linear Measurements vs Matrix-Vector Products

- If A is $n \times n$, matrix-vector products can be simulated with n linear measurements
- n linear measurements are **at least** as powerful as one matrix-vector product
- Trace can be computed exactly with **one** linear measurement
 - Requires $\Omega(n)$ matrix-vector products for exact trace
 - Sun, Woodruff, Yang, Zhang '21 (Triangle detection)
 - Requires $\Omega(1/\varepsilon^2)$ for approximating up to $1 \pm \varepsilon$
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Upper Bounds