

Number of measurements needed

Estimation bound (whp)



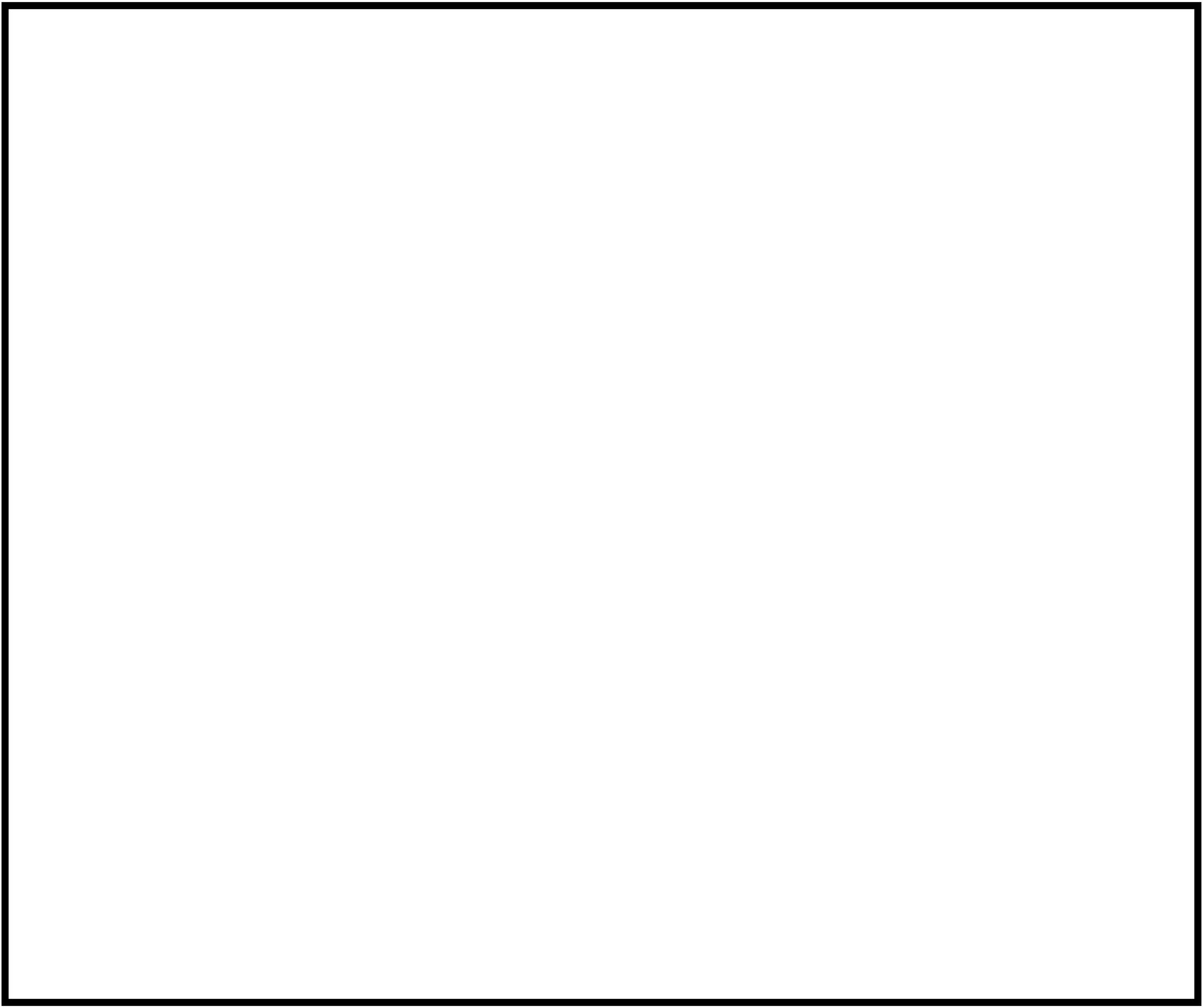
Theoretical guarantees

Number of measurements needed

Estimation bound (whp)

$$\|\hat{M} - M\|_F \lesssim r^{3/2} \left(\frac{D}{N}\right)^{1/3}$$

$$n \lesssim rD \Leftrightarrow N \lesssim m r D$$

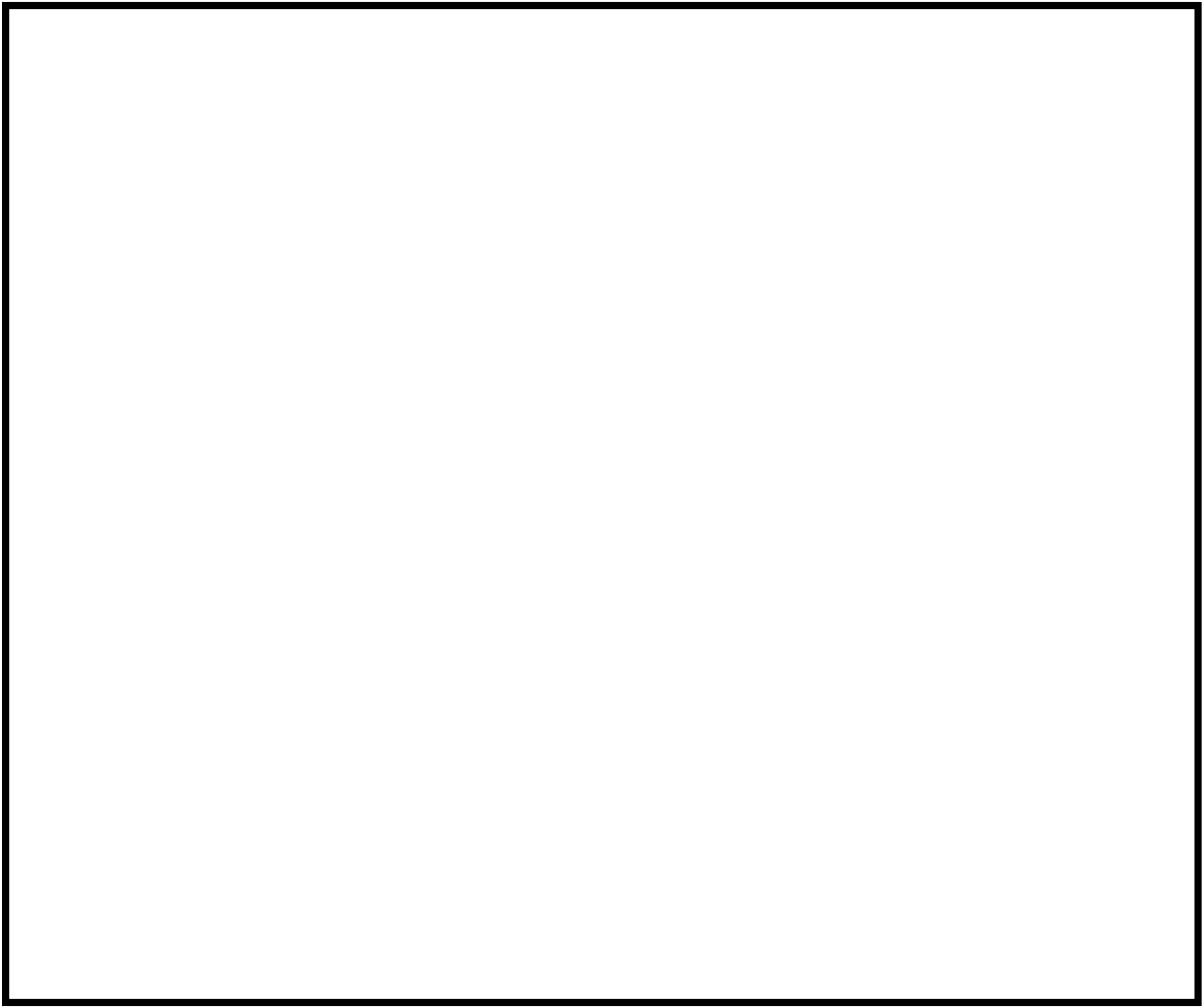




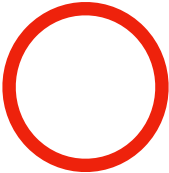


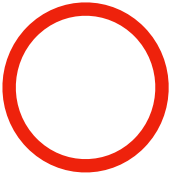
$$\|\hat{M} - M\|_F \lesssim \sqrt{\frac{rD}{N}}$$

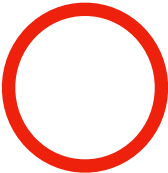
N *≳* *rD*



$$\text{Set } m \approx \left(\frac{N}{D}\right)^{1/3}, \tau \approx \sqrt{\frac{N}{mD}}$$







[12]Negahban and Wright. (2012)

[13] Tsybakov and Rohde. (2012)

Theoretical guarantees

Our results (inverted measurements)

Number of measurements needed

$$n \gtrsim rD \iff N \gtrsim mrD$$

Estimation bound (whp)

$$\text{Set } m \approx \left(\frac{N}{D}\right)^{1/3}, \tau \approx \sqrt{\frac{N}{mD}}$$
$$\|\widehat{M} - M\|_F \lesssim r^{3/2} \left(\frac{D}{N}\right)^{1/3}$$

Standard results (e.g., [12, 13])

Number of measurements needed

$$N \gtrsim rD$$

Estimation bound (whp)

$$\|\widehat{M} - M\|_F \lesssim \sqrt{\frac{rD}{N}}$$

PAQs beat other queries for metric learning

- Noiseless simulation setting comparing paired comparisons [8], triplets [9], and ranking queries [10]

