# Nyström $M$-Hilbert-Schmidt Independence Criterion (#294)

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# Nyström *M*-HSIC

- Motivation:
    - HSIC (a.k.a. distance covariance): popular dependency measure, various applications.
    - Bottleneck: quadratic runtime.
    - Existing speedup: $M = 2$ components, no guarantees.
- Contributions ($M \geq 2$):
    - Improved runtime: $\mathcal{O}\left(n^2\right)$ to $\mathcal{O}\left(n^{3/2}\right)$,
    - convergence rate: $\mathcal{O}_p\left(\frac{1}{\sqrt{n}}\right)$.
- Experiments: causal discovery, dependency testing of media annotations.

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