Analysis of Nyström Method with Sequential Ridge Leverage Score Sampling

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INVENTEURS DU MONDE NUMÉRIQUE

Kernel Ridge Regression (KRR)

Full Kernel Matrix $\boldsymbol{K}_n$

↳ $O(n^2)$ space **unfeasible**

KRR with Nyström Ridge Leverage Score (RLS) Sampling

Approximate Kernel Matrix $\widetilde{\boldsymbol{K}}_n$

↳ ~~$O(n^2)$~~ ⟶ $O(n\, d_{\text{eff}})$ space

↳ **Batch risk bounds**

Computing **exact** RLS

↳ $O(n^2)$ space **unfeasible**

KRR with sequential RLS Sampling

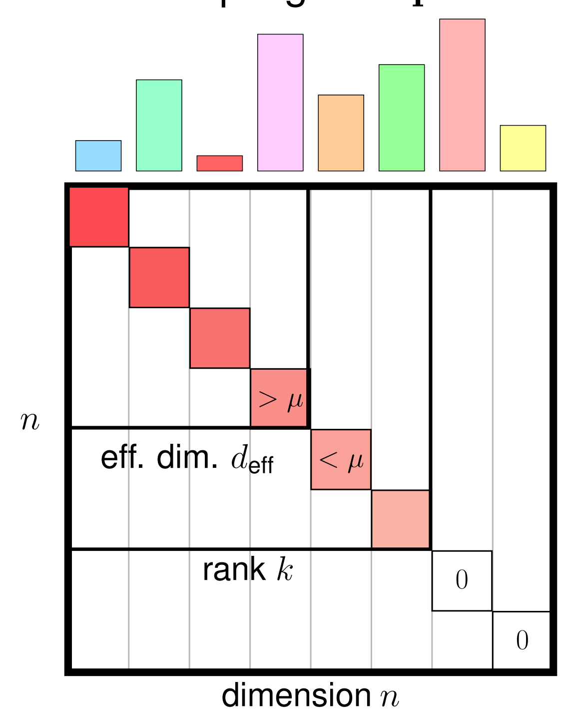
Approximate Kernel Matrix $\widetilde{\boldsymbol{K}}_n$

↳ ~~$O(n^2)$~~ ⟶ $O(n\, d_{\text{eff}}\, \rho)$ space

Computing **approx.** RLS **sequentially**

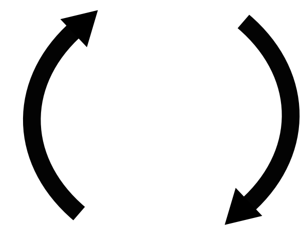
↳ ~~$O(n^2)$~~ ⟶ $O(n\, d_{\text{eff}}\, \rho)$ space

↳ **Any-time risk bounds**



INK-Estimate:

Use **dictionary** to update **estimates**



Use **estimates** to update **dictionary**

↳ **Single-pass**