A Random-Matrices Framework for Nyström Method

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Abstract: Calculating largest eigenvalues and the corresponding eigenvectors of a large positive definite matrix sometimes is difficult. Instead the underlying matrix is replaced by a lower rank one, the Nyström approximation. We try to give a justification for this practical method. Consider a fixed positive definite kernel $K(x, y)$ and an $i.i.d.$ sequence of $r.v.'s$ X_i. We study the limiting properties of largest eigenvalues and the corresponding eigenvectors got from the Nyström method applied on random matrices $[K(X_i, X_j)]_{1\le i,j\le n}$. This is an ongoing work with Zhidong Bai, Lobin Chang, Su-Yun Huang.