

Principle Components Updates via Matrix Perturbations

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Abstract : This paper highlights a new approach to look at online principle components analysis (OPCA). Given a data matrix $X \in \mathbb{R}^m \times \mathbb{R}^n$ we characterise the online updates of its covariance as a matrix perturbation problem. Up to the principle components, it turns out that online updates of the batch PCA can be captured by symmetric matrix perturbation of the batch covariance matrix. We have shown that as $n \rightarrow \infty$, the batch covariance and its update become almost similar. Finally, utilize our new setup of online updates to find a bound on the angle distance of the principle components of X and its update.

Keywords : online data updates, covariance matrix, online principle component analysis, matrix perturbation

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