

GRADIENT-TYPE SUBSPACE ITERATION METHODS FOR SYMMETRIC EIGEN-PROBLEM

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Computing invariant subspaces is at the core of many applications, from machine learning to signal processing, and control theory, to name just a few examples. Often one wishes to compute the subspace associated with eigenvalues located at one end of the spectrum, i.e., either the largest or the smallest eigenvalues. It is also quite common that the data at hand undergoes frequent changes and that one is required to keep updating or tracking the target invariant subspace. For such problems, the subspace iteration algorithm is ideally suited. The talk will explore variants of the subspace iteration algorithm for computing approximate invariant subspaces. The talk will start by reviewing the subspace iteration approach and then discuss a few variants that exploit gradient-type techniques combined with a Grassmann manifold viewpoint. A gradient descent/ascent method as well as a conjugate gradient technique will be described and analyzed. Numerical experiments will illustrate the behavior of the algorithm on a few examples.

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