

If It's Fast It Must Be Newton's Method

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Abstract:

Shifted inverse and Rayleigh quotient iteration are well-known algorithms for computing an eigenvector of a symmetric matrix. In this talk we demonstrate that each of these algorithms can be viewed as a standard form of Newton's method from the nonlinear programming literature. This provides an explanation for their good behavior despite the need to solve systems with nearly singular coefficient matrices. Our equivalence result also leads us naturally to a new proof that the convergence of the Rayleigh quotient iteration is q -cubic with rate constant at worst 1.