Fast ranking of nodes on digraphs

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One of the main issues in complex networks theory is to find the "most important" nodes within a graph G. To this aim, one can use matrix functions applied to its adjacency matrix. We will introduce a new computational method to rank the nodes of a directed unweighted network according to the values of these functions. The algorithm uses a partial singular value decomposition, in order to obtain a low-rank approximation of the adjacency matrix, and then Gauss quadrature is used to refine the computation. The method is compared to other approaches on networks coming from real applications, e.g. in software engineering, bibliometry and social networks.