

STEADY-STATE ANALYSIS OF GOOGLE-LIKE STOCHASTIC MATRICES WITH BLOCK ITERATIVE METHODS*

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Abstract. A Google-like matrix is a positive stochastic matrix given by a convex combination of a sparse, nonnegative matrix and a particular rank one matrix. Google itself uses the steady-state vector of a large matrix of this form to help order web pages in a search engine. We investigate the computation of the steady-state vectors of such matrices using block iterative methods. The block partitionings considered include those based on block triangular form and those having triangular diagonal blocks obtained using cutsets. Numerical results show that block Gauss-Seidel with partitionings based on block triangular form is most often the best approach. However, there are cases in which a block partitioning with triangular diagonal blocks is better, and the Gauss-Seidel method is usually competitive.

Key words. Google, PageRank, stochastic matrices, power method, block iterative methods, partitionings, cutsets, triangular blocks

AMS subject classifications. 60J10, 65F10, 65F50, 65B99

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