

# Digraph-based conditioning for Markov Chains

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## ABSTRACT

For an irreducible stochastic matrix  $T$ , we consider a certain condition number  $c(T)$ , which measures the stability of the corresponding stationary distribution when  $T$  is perturbed. We characterize the strongly connected directed graphs  $D$  such that  $c(T)$  is bounded as  $T$  ranges over  $\mathcal{S}_D$ , the set of stochastic matrices whose directed graph is contained in  $D$ . For those digraphs  $D$  for which  $c(T)$  is bounded, we find the maximum value of  $c(T)$  as  $T$  ranges over  $\mathcal{S}_D$ .