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GRAPH-THEORETIC GENERALIZATION OF THE BEST CHOICE
PROBLEM; RANDOMIZED ANALYSIS OF A SIMPLE EFFECTIVE
ALGORITHM FOR k-ARY TREES

We consider the following on-line decision problem. The vertices of a graph which is a complete rooted directed k-ary tree are being observed one by one in some random order by a selector. At time t the selector examines the t-th vertex and knows the graph induced by the t vertices that have already been examined. The selector's aim is to choose the root by taking the currently examined vertex. We propose and analyze a simple deterministic algorithm for the selector to follow. Using randomized techniques it is shown that its probability $p(k)$ of the right choice tends to 1 as k tends to infinity. A multiple randomization is introduced and applied to find the asymptotic probability of success of this algorithm. It is shown that for the binary tree this asymptotic probability is equal to $2\ln(2) - 1$ and for the ternary tree $1.5\ln(3) - 2 + \pi/(2 \cdot 3^{0.5})$ with the height of the tree tending to infinity.