Secretary problem for powers of paths via percolation

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Abstract. The vertices of a kth power of a directed path of length $n-1$ are exposed one by one to a selector in some random order. At any time the selector can see the graph induced by the vertices that have already come and gets some extra information about the edges that have already emerged. The selector's aim is to choose on-line the maximal vertex (i.e., the vertex with no outgoing edges). We give the exact asymptotic behavior of the probability of success p_n of the optimal algorithm: $\lim_{n\to\infty} p_n n^{1/(k+1)} = \Gamma(1+1/(k+1))$. In order to prove this result we analyze a site percolation process on a sequence of kth powers of a directed path of length $n-1$.

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