

An Optimal Multiple Selection Problem with Partial Recall Based on Relative Ranks

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Abstract

A company wants to employ m workers through the coming n periods and a sufficiently large number of rankable applicants appear in random order over these periods (1 being the best, 2 the second best and so forth). As they appear, only their relative ranks with respect to their predecessors can be observed. The company is allowed to solicit, at the end of each period, any applicant that has arrived in that period. The applicants not chosen are lost and unavailable later. When the company employs an applicant, a loss is incurred depending on the rank of the applicant. Then the problem of the company is to determine, at the end of each period, how many topmost applicants to choose from among those that have arrived in that period based on the full memory of the relative ranks of the applicants that have arrived by that time, in order to minimize the total expected loss. We obtain the structure of the optimal rule and give a recursive formula for calculating the optimal value and the decision numbers efficiently. When m is divisible by n , a simple rule is defined and compared with the optimal rule. Some generalizations are also made.