

## A Two Tailed Secretary Problem with Multiple Criteria

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**Abstract :** The following study considers some variations made to the secretary problem (SP). In a multiple criteria secretary problem (MCSP), the selection of a unit is based on two independent characteristics. The units that appear before an observer are known say  $N$ , the best rank of a unit being  $N$ . A unit is selected, if it is better with respect to either first or second or both the characteristics. When the number of units is large and due to constraints like time and cost, the observer might want to stop earlier instead of inspecting all the available units. Let the process terminate at  $r_2$ th unit where  $r_1 < r_2 < N$ ,  $r_1$  being the number of units observed but not selected. This situation is called as a two tailed secretary problem (TTSP). The article presented tries to analyze the combination of TTSP and multiple criteria in detail. Joint as well as marginal probability distributions (of real ranks of both the characteristics and the position at which the selection is made) have been derived systematically using a simple yet explicable method. A new criterion for selecting the best unit based on the expected real rank has been developed.

**Keywords :** joint distribution, marginal distribution, real ranks, secretary problem, selection criterion, two tailed secretary problem

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