# ON A GENERALIZED EULERIAN DISTRIBUTION

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**Abstract.** The distribution with probability function $p_k(n, \alpha, \beta) = A_{n,k}(\alpha, \beta)/(\alpha+\beta)^{[n]}$, $k = 0, 1, 2, \ldots, n$, where the parameters $\alpha$ and $\beta$ are positive real numbers, $A_{n,k}(\alpha, \beta)$ is the generalized Eulerian number and $(\alpha+\beta)^{[n]} = (\alpha+\beta)(\alpha+\beta+1)\cdots(\alpha+\beta+n-1)$, introduced and discussed by Janardan (1988, *Ann. Inst. Statist. Math.*, **40**, 439–450), is further studied. The probability generating function of the generalized Eulerian distribution is expressed by a generalized Eulerian polynomial which, when expanded suitably, provides the factorial moments in closed form in terms of non-central Stirling numbers. Further, it is shown that the generalized Eulerian distribution is unimodal and asymptotically normal.

*Key words and phrases*: Eulerian numbers, Eulerian polynomials, Stirling numbers, random permutations, unimodality, asymptotic normality.