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Bivariate Markov chain embeddable variables of polynomial type

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Abstract The primary aim of the present article is to provide a general framework for investigating the joint distribution of run length accumulating/enumerating variables by the aid of a Markov chain embedding technique. To achieve that we introduce first a class of bivariate discrete random variables whose joint distribution can be described by the aid of a Markov chain and develop formulae for their joint probability mass function, generating functions and moments. The results are then exploited for the derivation of the distribution of a bivariate run-related statistic. Finally, some interesting uses of our results in reliability theory and educational psychology are highlighted.

Keywords Success runs · Run lengths · Markov chains · Consecutive-r-out-of-n: F system