Bagchi, A.; Pal, A. K.

Asymptotic normality in the generalized Polya-Eggenberger urn model, with an application to computer data structures. (English) Zbl 0568.60010

SIAM J. Algebraic Discrete Methods 6, 394-405 (1985).

In the generalized Polya-Eggenberger urn model, an urn initially contains a given number of white and black balls. A ball is selected at random from the urn, and the number of white and black balls added to (or taken away from) the urn depends on the color of the ball selected. Let w_n be the random variable giving the number of white balls in the urn after n draws. A sufficient condition is derived for the asymptotic normality, as $n \to \infty$, of the standardized random variable corresponding to w_n. This result is then used for estimating the computer memory requirements of the 2-3 tree, a well-known computer data structure for storage organization.

MSC:

60C05 Combinatorial probability
60F05 Central limit and other weak theorems
62E20 Asymptotic distribution theory in statistics
68R99 Discrete mathematics in relation to computer science

Keywords:

generalized Polya-Eggenberger urn model; asymptotic normality

Full Text: DOI

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