Random Indexed Random in Limit Theorems Number Characteristics of Quantities Calculation

Ne'matov Islom

Fergana State University Candidate of physical and mathematical Sciences

Ro'zikov Maxammadjon Mamirali o'g'li

Teacher of the Department of mathematics

Annotation: This paper provides information on the calculation of numerical characteristics of random quantities in random index limit theorems.

Keywords: mathematical expectation, variance, moments, sum of random quantities with random index.

In probability theory, when calculating the numerical characteristics of random quantities (mathematical expectation, variance, moments), it is important to know what values the random quantities take with probability. If a random quantity takes different values with the same probability, then the mathematical expectation of a random quantity gives the average value of that quantity, if it takes different values, it is a mathematical expectation.

This paper examines the numerical characteristics of the sum of random quantities with different distributed random indices.

Definition. **If**

1. $\quad \xi_1, \xi_2, \ldots, \xi_n, \ldots$ $\qquad\qquad$ (1)

unless the sequence of random quantities is interrelated.

2. $\quad v = v(\lambda), \ (\lambda > 0)$ - if a random quantity is a random quantity that receives all positive values,

3. $\quad$ (1) and v If the random variables are not interdependent, then the random variables $\xi_1, \xi_2, \ldots, \xi_n, \ldots, v$ are called random quantities that obey Wald's law.

From (1) we construct the following sum:

$$\zeta_v = \sum_{j=1}^{v} \xi_j \qquad\qquad (2)$$

$$M\xi_j = a_j, \quad D\xi_j = \upsilon_j^2$$

for $v = v(\lambda)$, say $p(v = k)$,

we define
$$Mv = \sum_{k=1}^{\infty} k \quad p \ (v = k) = \alpha$$

$$D\gamma = \sum_{k=1}^{\infty} (k - \alpha)^2 \, p(v = k) = \gamma^2 \, .$$

(2) is a complex set that is called "random index random variables" and their properties are studied. Such issues are common in the social spheres, economics, and physics.

We enter the following definition:

$$A_k = \sum_{j=1}^{k} a_j, \quad A_v = \sum_{j=1}^{v} a_j, \quad MA_v = \sum_{k=1}^{\infty} A_k \, p(v = k) = \rho$$

$$DA_v = \sum_{k=1}^{\infty} (A_k - \rho)^2 \, p(v = k) = \gamma_1^2 \, ,$$

$$V_k^2 = \sum_{j=1}^{k} \upsilon_j^2, \quad V_v^2 = \sum_{k=1}^{\infty} \upsilon_k^2 \, p(v = k)$$

$$MV_v^2 = \sum_{k=1}^{k} V_k^2 \, p(v = k) = \sigma^2 \, ,$$

Lemma.

$$M\zeta_v = \sum_{k=1}^{\infty} A_k \, p(v = k) = \rho \, ,$$

$$MA_v = M\zeta_v = \rho$$

Proof is given in [2].

Theorem 1. (2) The variance of the sum

$$D\zeta_v = \sigma^2 + \gamma_1^2$$

Proof.

$$D\zeta_v = M\zeta_v^2 - [M\zeta_v]^2 = M\zeta_v^2 - \rho^2 \, ,$$

$$M\zeta_v^2 = \sum_{k=1}^{\infty} M \left(\sum_{j=1}^{\infty} \xi_j \right)^2 p(v = k) =$$

$$= \sum_{k=1}^{\infty} M \left(\sum_{i=1}^{k} \xi_j^2 \right) p(v = k) + 2 \left(\sum_{1 \le i < j \le k} a_i a_j \right) p(v = k) \tag{2}$$

$$\sum_{j=1}^{k} M\xi_j^2 \, p(v = k) = V_k^2 + \sum_{j=1}^{k} a_j^2 \tag{3}$$

(2) and (3) from the relationship

$$D\zeta_v = \sum_{k=1}^{\infty} V_k^2 p(v=k) + \gamma_1^2 = \sigma^2 + \gamma_1^2$$

Based on the above data, (3) is the third-order moment of the sum $-\beta_3$ can be calculated.

Theorem 2. $\beta_3 = M\zeta_v^2 - 3M\zeta_v^2\rho + 2\rho^2$.

Proof. $\beta_3 = M(\zeta_v - M\zeta_v^2)^3 = M(\zeta_v - \rho)^3$.

Let's simplify this by lifting the cube

$$M\zeta_v^3 - 3\rho M\zeta_v^2 + 3\rho^3 - \rho^3 = M\zeta_v^3 - \rho \cdot 3M\zeta_v^2 + 2\rho^2.$$

(2) By giving values to random quantities, the values of are found.

Literature

1. H.Robbins. Asymptoric distribution of the sum of a random number of random vapiables. Bull of the Amer. Math, Sod,54, № 12 1948, 1151-1161

2. И.Неъматов. Кандидатская диссертация.1975

3. Ne'matov I., Axmedov O.U., BOULE FUNCTION AND ITS INTERPRETATION – Namdu Ilmiy axborotnomasi 3-son, 2021 y. 23-27 b.

4. Madrahimov A.E., Axmedov O.U., Оценка скорости сходимости в зкане больших чисел – Namdu Ilmiy axborotnomasi 5-son, 2022 y. 106-112 b.

5. U.Xonqulov, O.Axmedov, A.Nishonboyev, Parametrik tenglamalarini yechish metodikasi haqida. O'zbekiston milliy universiteti xabarlari, 2021, [1/6/1] ISSN 2181-7324, 224-228 betlar.

6. Samatov B.T., Axmedov O.U., Doliyev O.B. The strategy of parallel pursuit for differential game of the first order with Gronwall-Bellman constraints. – Namdu Ilmiy axborotnomasi 4-son, 2020 y. 15-20 b.

7. Samatov B.T., Axmedov O.U., Abdumannopov M.M. Задача убегания для дифференциальных игр первого порядка с ограничением Гронуолла - Беллмана. – Central Asian journal of mathematical theory and computer sciences ISSN 2660-5309 Volume 02, Issue 06, 2021 1-5 bet.

8. AUY Qizi (2022). EVEN AND ODDFEATURES FURE ROW FOR. Gospodarka i Innowacje 22, 25-28.

9. АДН Раджабов Б. Ш. Ахмедова У. Ё. (2021). ФУРЬЕ ҚАТОРЛАРИНИ ЯГОНА НУҚТАГА ЯҚИНЛАШИШИНИИНГ БАЪЗИ ШАРТЛАРИ ХАҚИДА. Polish Science Journal 1 (4), 303-311

10. Axmedova, U. (2021). ON CERTAIN CONDITIONS OF STRIKING COEFFICIENTS OF FOURIER SERIES TO ZERO. *Scientific Bulletin of Namangan State University*, *3*(3), 3-8.