MAGISTRLAR 2024 - YANVAR

"Tasodifiy maydonlar uchun eksponensial baxolar"

Namangan Davlat universiteti magistrant,
Iminova Shaxloxon Ixvoljon qizi.

Namangan Davlat universiteti
G'ofurov.M, f-m.f.n. dotssent,

"Exponential Values for Random Fields"

Namangan State University, master:
Iminova SH
Namangan State University, docent, G'ofurov.M

Abstract: This paper presents an exponential estimate for the probability deviation of the supremal semi-orm for random variables. As a result, the re-logarithmic law of the specified sum was evaluated to the law of larger numbers. The results serve as places for the empirical distribution function.

Key words: exponential, probability, random quantities, estimate, norm, mixing coefficient, limit.

The entrance: Over the past 85 years, the attention of specialists in probability theory and mathematical statistics has been drawn to the problem of convergence of empirical distributions[1]. This is also facilitated by the fact that the idea of testing hypotheses based on an empirical distribution function plays an important role in applied problems of statistics, therefore the study of the asymptotic behavior of empirical processes is the subject of research by many authors. This includes the works of such prominent scientists as A.N. Kolmogorov[2], R. Dudley, P. Gaenssler, W. Stute, etc.

First results whe.n the sample space is one-dimensional (observations are independent random variables). The proof of these results contributed to the emergence of a number of new ideas and methods, and the results themselves became classics of modern probability theory. This especially applies to the works of A.N. Kolmogorov, who had a great influence on the development of research in such areas as limit theorems for random processes, limit theorems in linear normed spaces, nonparametric statistics[2].

Basic concept. Currently, the attention of specialists is attracted to the problem of convergence of empirical measures on arbitrary finite-dimensional and infinite-dimensional spaces. Important generalizations of classical results relating to the one-dimensional case are obtained, conditions for convergence in limit theorems for empirical measures from independent observations, close to final ones, are found[4]. The developed methods, based on the use of such concepts of modern analysis as metric entropy and finite-dimensional widths, also made it possible to establish a number of new limit theorems in Banach spaces.

The problem of convergence of empirical measures formed from dependent observations in certain spaces has received great development. The development of this area of research is closely connected with the names of I. Berkes, W. Fillipp [3], M. Deo, R. Yokoyama[3], and others. In [2] I.S. Borisov obtained exponential estimates for the probabilities of deviations of a certain supremal seminorm of sums of independent identically distributed random fields with an arbitrary parametric set.

The solution to the problem. The goal of the work is to obtain the corresponding results for a sequence of random fields that is stationary in the narrow sense and satisfies the condition of uniformly strong mixing[5].

Let ζ(t,ω), t∈T-real-valued random field with an arbitrary parametric set [6] T, defined on the main probability space (P,ℑ,Ω). Let's determine the distribution of a random element ζ(t,ω):

$$P_{\zeta(t,\omega)}(B) = P\{\omega: \zeta(t,\omega) \in B\}, B \in R \qquad (1)$$

For any σ - subalgebras ℑ⊂1ℵ and ℑ⊂2ℵ we introduce distances between them as follows:

$$\varphi(\aleph_1 \aleph_2) = \sup_{A \in \aleph_1} \left| P(\frac{B}{A} - P(B)) \right. \qquad (2)$$

Sequence of random fields $\zeta_i(t,\omega), i \geq 1$, where$t \in T$, is called satisfying the condition of uniformly strong mixing (u.s.m.) if:

$$\lim_{n\to\infty} \varphi(n) = 0. \qquad (3)$$

The logarithm of the minimum number of subsets $\{V_i(\varepsilon)\}$ with the indicated property is called), (ξ,ε)- is the entropy of the set T_0 and is denoted by H_ξ.

Summary. Of particular interest [7] is the special case when **ζ(t,ω)= t(X_i)**, this a stationary, in the narrow sense, sequence of random variables with values in an arbitrary measurable space **$(\beth(T), R)$** and satisfying the condition of uniformly strong mixing and is **T=$\{t(0)\}$** $-$ a certain subset of real-valued measurable functions. In particular, if **T=$\{I_A(0)\}$** $-$ the set of indicators of all measurable subsets, then in this case for the empirical measure $S_k^{(n)}(A) = n^{-\frac{1}{2}} \sum_{i=0}^{k} [I_A(X_i) - P_{Xi}()A]$ all results remain valid.

List of used literature.

1. Berkes I., Fillipp W. An almost sure invariance principle for the empirical distribution function of mixing random variables, Z.Wahrach.verw.Gebiete.- 1977. -vol.41.- p.115

2. Борисов И.С. Экспоненциальные оценки для распределений сумм независимых случайных полей // Сибирский математический журнал. 2009. Т. 50. No5. С. 987-1009.

3. Yokoyama R. The law of the iterated logarithm for empirical distributions for m-dependen random variables // Yokohama math. J., 1976.- vol.24. – p.79-91.

4. Sirojiddinov S. X., Mamatov M. M. Ehtimollar nazariyasi va matematik statistika. Toshkent, «0‘qituvchi», 1980

5. A.Rasulov, G.Raimova, X.Sarimsoqova-Ehtimollar nazariyasi va matematik statistika.T-2006

6. A.Abdushukurov, N.Nurmuhammedova, K.Sagidullayev - Matematik statistika. Toshken(universitet) - 2006.

7. Abdushukurov A.A. Ehtimollar nazariyasi va matematik statistika. Toshkent, Universitet, 2010-y. 169 b.