

ENTROPY AND INFORMATION IN P-ADIC FIELD

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Nowadays, one of the most relevant fields of information theory is the study of quantum positions. In particular, this deals with the fact which is fundamentally different ways of its transmission due to quantum mechanisms [1]. Instead of this approach associated with the entropy theory of information, one of the modern approaches corresponds to the modeling of the work of brain. The point of interest is the modeling of thinking processes in the p-adic systems of developed coordinates[2]. In this paper, the entropy and information are considered in the p-adic field Q_p , where p is a prime number. The aim of this paper is determined the importance of these characters for describing the working process of brain. In the Q_p field, all arithmetic operations, consisting of division, are correctly defined. Q_p elements are respectively as follows:

$$x = \frac{a_{-k}}{p^k} + \dots + a_0 + \dots + a_n p^n + \dots, a_i = 0, 1, \dots, p-1 \quad (1)$$

Based on the quantum-entropy approach, using p-adic coordinates in the work, expressions for information are obtained. In the conditions of independence, the values of X (input) and Y (output), such an expression as the form of:

$$I(X; Y) = -\left(\sum_{x \in \Omega} \left(\sum_{i=0}^{k-1} \frac{a_{i-k}^{(1)}}{p_1^{k-i}} \log_2 \left(\sum_{i=0}^{k-1} \frac{a_{i-k}^{(1)}}{p_1^{k-i}}\right)\right)\right) \left(1 - \sum_{x \in \Omega} \left(\sum_{i=0}^{k-1} \frac{a_{i-k}^{(2)}}{p_2^{k-i}} \log_2 \left(\sum_{i=0}^{k-1} \frac{a_{i-k}^{(2)}}{p_2^{k-i}}\right)\right)\right)$$

References

1. Holevo A.S. *Introduction to quantum information theory*. – M.: MTSNMO, 2002. – 128 pgs.
2. Khrennikov A.Yu. *Modeling of thinking processes in p-adic coordinate systems*. – M.: Fizmatlit, 2004. – 296pgs.