

UDC 519.987

# Algorithm for Efficient Entropy Estimation

Ivanov I. I.<sup>1</sup>

*P.G. Demidov Yaroslavl State University,  
Sovetskaya str., 14, Yaroslavl, 150000, Russia*

*e-mail: III@gmail.com*

*received April 15, 2013*

**Keywords:** entropy, nonparametric statistic, metric, ball

We consider the problem of ... The article is published in the author's wording.

## Introduction

The paper studies the problem of

## 1. Problem Statement

Let  $\Omega = A^{\mathbb{N}}$  and  $\mu$  be a shift-invariant ergodic probability measure on  $\Omega$ .

### 1.1. Properties of Estimator

Let  $\xi_0, \xi_1, \dots, \xi_n$  be independent random variables taking values in  $\Omega$  and identically distributed with a common law  $\mu$ .

### 1.2. Nearest Neighbor Entropy Estimator

## 2. Metrics on $\Omega = A^{\mathbb{N}}$

In this section we introduce a wider class of so-called [1] *weak* metrics, for which the triangle inequality holds with some constant  $C > 1$ .

---

<sup>1</sup>Supported by the Russian government project

## 2.1. Nearest Neighbor Entropy Estimator

### References

1. Deza M., Deza T. *Encyclopedia of Distances*, Springer, 2009.
2. Kaltchenko A., Timofeeva N. Entropy Estimators with Almost Sure Convergence and an  $O(n^{-1})$  Variance // *Advances in Mathematics of Communications*. 2008. V. 2, №1. P. 1–13.
3. Silvapulle, M.J., Sen, P.K. *Constrained statistical inference: Inequality, order and shape restrictions*, John Wiley & Sons, USA. 2005.
4. Timofeev E.A. *Statistical Estimation of measure invariants* // *St. Petersburg Math. J.* 2006. 17, №3. P. 527–551.
5. Gradshteyn I.S., Ryzhik I.M. *Tablitsy integralov, summ, ryadov i proizvedeniy*. Moskva: Nauka, 1971 [in Russian].

### Алгоритм эффективного оценивания энтропии

Иванов И.И.

*Ярославский государственный университет им. П. Г. Демидова  
150000 Россия, г. Ярославль, ул. Советская, 14*

**Ключевые слова:** энтропия, непараметрическая оценка, метрика, шар

Рассматривается задача .... Статья публикуется в авторской редакции.

**Сведения об авторе:** Иванов Иван Иванович,  
Ярославский государственный университет им. П.Г. Демидова,  
д-р физ.-мат. наук, профессор