#### Journal of Physics: Conference Series 2017 vol.936 N1

# Methods of verification of compliance with an asymptotically power law

Belashova I., Bochkarev V., Tyurin V.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

### Abstract

© Published under licence by IOP Publishing Ltd. This paper describes methods of the power law verification using different empirical data. We do not analyse the value of deviations from the model but try to found out whether these deviations are regular or random. The suggested approach is based on the idea of finding local power approximation of the considered series for each range of ranks, after which one or another trend criterion is applied to the obtained series of local exponents. Application of the runs test is also discussed. The suggested methods were tested using 10 sets of empirical data, which are available for free. It was shown that compliance with the power law is satisfactory only in one case.

http://dx.doi.org/10.1088/1742-6596/936/1/012074

# Keywords

power-law distribution, robust criteria, runs test, Zipf's law

# References

- [1] Newman M. E. J. 2005 Power laws, Pareto distributions and Zipf's law Contemporary Physics 46 323-351
- [2] Clauset A., Shalizi C. R. and Newman M. E. J. 2009 Power-law distributions in empirical data SIAM Review 51 661-703
- [3] Bochkarev V.V. and Lerner E.Y. 2012 The Zipf law for random texts with unequal probabilities of occurrence of letters and the Pascal pyramid Russian Mathematics 56: 25
- [4] Bochkarev Vladimir V. and Lerner Eduard Yu. 2014 Strong power and subexponential laws for an ordered list of trajectories of a Markov chain Electronic Journal of Linear Algebra 27 534-556
- [5] Himmelblau David M. 1970 Process Analysis by Statistical Methods (John Wiley & Sons Inc)