

About human activity, long-term memory, and Gibrat's law

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Human behavior is reflected in many social, technological, and economic systems comprising complex and non-trivial structures. Despite several decades of investigation the mechanisms driving humans still remain a central question in sociology and economy. Various statistical laws have been reported to characterize human originated data. One of them, established as Gibrat's law, characterizes growth of units such as companies or cities. It states that neither average growth nor standard deviation of the growth depend on the actual size of the unit. Here we investigate scaling in the human activity of sending messages in online communities by considering the number of messages sent by each individual as a growth process. We analyze millions of messages sent in two social communities and uncover power-law relations between the growth rate and the activity of the members – and thus a violation of Gibrat's law. We attribute this scaling to long-term memory beyond daily or weekly cycles. Applying numerical simulations based on an underlying long-term correlated process we elaborate a consistent framework for the empirical evidences.

Keywords

human dynamics, long-term correlations, growth