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Crime rate vs. population: What really is the dependence?

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The Uniform Crime Report (UCR) database is an important repository of criminal data administered by the FBI since 1930.

In this work, we use recent UCR data to analyze how crime rate varies with population size for US communities. It is seen that the variability is very high, especially in the smaller settlements, and a major obstacle for deriving a model. To circumvent such difficulty, n groups are established, each comprising approximately $1/n^{th}$ of the total US population, and disposed in ascending order of population. For each group, we calculate the crime rate, given as total crime count divided by total population, which can be plotted against some measure of the respective average number of inhabitants (e.g. the median for each group). It is seen that the results do not critically depend on n ($5<n<15$), and indicate that crime rate grows monotonically up to 1 million inhabitants, and then decreases for even more populated urban areas. A similar result is obtained if crime rate is directly averaged for each group. This trend is used to provide a functional form for fitting the individual data points. We suggest

$$R = R_{\infty} + (R_0 - R_{\infty} + a\ pop)e^{-b\ pop}$$

where R is the crime rate for population pop, R0 and R∞ the corresponding values for the asymptotic limits of zero and infinite populations, and a and b fitting parameters.

To conclude, we discuss the profiles found for individual US states.

Biography

A.A.C.C. Pais completed his PhD in Chemistry in 1993, and is an Associate Professor in the Chemistry Department of the University of Coimbra, Portugal. He has published ca. 100 papers, books and book chapters in different areas of Chemistry and Pharmaceutics. He was the Coordinator of the Forensic Chemistry M. SC in its first edition (2009-2012). His research interests include Chemometrics and Scientometrics.

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