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Socioeconomic correlations in communication networks

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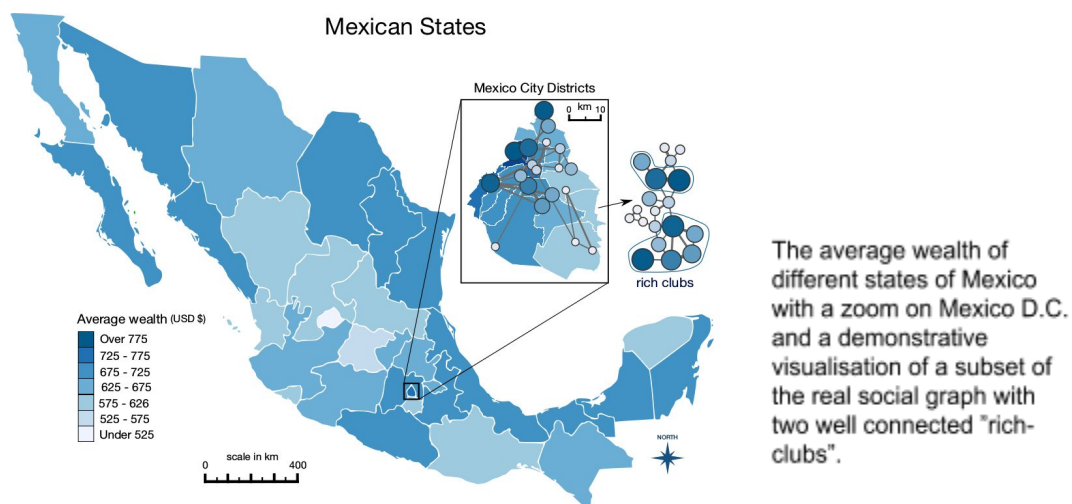[2] Grandata Labs, Buenos Aires, Argentina
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The recent availability of large digital datasets gives us the opportunity to quantitatively study the structure and the dynamics of social networks of millions of individuals. However, although these studies consider the temporal, structural, and spatial characters of human interactions they commonly miss one important dimension regarding the economic status of individuals. Economic capacities of people may largely determine their communications and social behaviour thus the emerging structure of the global social-communication network. Studies combining the social network with economic data could help us to better understand spatial, and social segregation, or economic imbalances evolving in the society.

Here we consider information about the mobile communications, location, and economic capacities of people. We use a communication dataset recorded by a single mobile phone provider in Mexico, which collects geo-localised mobile phone interactions of 92M people over 2 years [1]. This anonymised dataset is combined with the credit informations of clients of a bank in the same country. The credit data collect the time and amount of bank card purchases and the monthly evolution of incomes, spendings, and debts of 1M clients of the cell phone operator.

The average wealth of different states of Mexico with a zoom on Mexico D.C. and a demonstrative visualisation of a subset of the real social graph with two well connected "rich-clubs".

Using these informations we estimate the economic status of people via their average monthly purchases, income, and debts. Beyond a demographic analysis and correlations between individual economic status indicators we provide empirical evidences about present economic imbalances suggesting not only the distribution of wealth but also the distribution

of debts to follow the Pareto principle. We categorize individuals into economic classes to understand the internal and interconnected structure of socioeconomic groups. From the classification, we observe a strongly stratified social structure, and detect assortative correlations between people in terms of their economic capacities. We provide quantitative results about the existence of "rich-clubs", economic and spatial segregation in the social structure.

[1] C. Sarraute, P. Blanc, and J. Burroni. A study of age and gender seen through mobile phone usage patterns in mexico. *In Advances in Social Networks Analysis and Mining (ASONAM), 2014 IEEE/ACM,* 836–843 (2014).