

SOCIAL FRAGMENTATION: DATA ANALYSIS AND MODELING FRAMEWORKS

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ABSTRACT

Despite the world becoming highly connected, societies seem to be increasingly polarized and fragmented. All over the globe, nationalist currents and regionalisms gain strength and threaten to radically transform the composition of countries and States as we know them. The basis of this phenomenon is in the complex structure and dynamics of social systems. Far from homogeneously mixing with each other, we self-organize into groups that can span across multiple scales, from families or friends up to cities and cultures. We study the modular structure of society using mobility and communication data obtained from social media. We see that societies are organized in geographical patches where people meet and interact both offline and online, revealing the geometry of the social tissue. The smaller patches can span across neighborhoods while the largest can span across states and countries. Given the challenges that we face as a global society, it is imperative that we learn the way societies are actually structured. The emergence of the structure we observe in the data can be explained with a network growth model that combines the preferential attachment mechanism, the human mobility gravity model and a spatial growth process based on nearest neighbors. In our model, we consider a regular lattice representing a map of geographical locations, simulating the way people travel. Three exponents control the effects of mechanisms. Model reveals that as highly connected places, cities act like gravity centers attracting human displacements from surrounding areas and creating spatial patches where people inhabit and interact with each other. The model is able to reproduce the heterogeneous spatial patterns of the degree distribution as well as the geographical modular structure of the resulting network.

Keywords: social fragmentation, mobility network, communication network, modular structure, modeling