UNIVERSITÀ DEGLI STUDI FIRENZE

FLORENCE center for DATA SCIENCE

# ABSTRACTS

## 9th Seminar D² Seminar Series

*Florence Center for Data Science 'Double' Seminar Series*

**Raffaele Guetto - Department of Statistics, Computer Science, Applications "G. Parenti", University of Florence**

Title: *Italy's lowest-low fertility in times of uncertainty*

Abstract: The generalized and relatively homogeneous fertility decline across European countries in the aftermath of the Great Recession poses serious challenges to our knowledge of contemporary low fertility patterns. The rise of economic uncertainty has often been identified, in the sociological and demographic literatures, as the main cause of this state of affairs. The forces of uncertainty have been traditionally operationalized through objective indicators of individuals' actual and past labor market situation. However, this presentation argues that the role of uncertainty needs to be conceptualized and operationalized taking into account that people use works of imagination, producing their own narrative of the future, also influenced by the media. To outline such an approach, I review contemporary drivers of Italy's lowest-low fertility, placing special emphasis on the role of uncertainty fueled by labor market deregulations and – more recently – the Covid-19 pandemic. I discuss the effects of the objective (labor-market related) and subjective (individuals' perceptions, including future outlooks) sides of uncertainty on fertility, based on a set of recent empirical findings obtained through a variety of data and methods. In doing so, I highlight the potential contribution of so-called "big data" and techniques of media content analysis and Natural Language Processing for the analysis of the effects of media-conveyed narratives of the economy.

**Andrea Marino - Department of Statistics, Computer Science, Applications "G. Parenti", University of Florence**

Title: *Approximating the Neighborhood Function of (Temporal) Graphs*

Abstract: The average distance in graphs (like, for instance, the Facebook friendship network and the Internet Movie Database collaboration network), often referred to as degrees of separation, has been largely investigated. However, if the number of nodes is very large (millions or billions), computing this measure needs prohibitive time and space costs as it requires to compute for each node the so-called neighbourhood function, i.e. for each vertex v and for each h, how many nodes are within distance h from v. Temporal graphs are a special kind of graphs where edges have temporal labels, specifying their occurring times, in the same way as the connections of the public transportation network of a city are available only at scheduled times. Here, paths make sense only if they correspond to sequences of edges with strictly increasing labels. A possible notion of distance between two nodes in a temporal network is the earliest arrival time of the temporal paths connecting the two nodes. In this case, the temporal neighbourhood function is defined as the number of nodes reachable from a given one in a given time interval, and it is also expensive to compute. We introduce probabilistic counting in order to approximate the size of sets and we show how both plain and temporal neighbourhood functions can be approximated by plugging this technique into a simple dynamic programming algorithm.