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April 15th, 2021, 5:30 PM CEST

SmartTalk: on Microsoft Teams

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Reconstructing epidemic cascades with autoregressive neural networks

ABSTRACT

In the case of inference of epidemic spreading of a disease, we usually have missing or partial information on an epidemic cascade. In order to understand, characterize and mitigate the spreading of diseases, it is fundamental to reconstruct the missed information.

In this talk, we will discuss our approach, based on a Bayesian framework, in which a model governing the spreading process and the contacts between individuals are given. We employ generative neural networks (Autoregressive Neural Network, ANN) to find the most probable epidemic cascades compatible with the given observations.

We are able to apply our ANN approach to several problems in epidemics, such as discovering the patient zero, or performing epidemic risk assessment. It is also possible, given the Bayesian nature of our approach, to infer the parameters of the epidemic model. In this talk, we will also show the performance of our framework in both synthetic cases and real case scenario.

BIOGRAPHY

PhD student in Physics at Politecnico di Torino, his research interests are centered on statistical inference in processes occurring on large scale networks. He obtained his Master's Degree in Physics of Complex Systems from Politecnico di Torino and Université Paris Diderot in 2019.