



Working Group on Statistical Learning Seminar

Title: Spatio-temporal modeling of COVID-19 incident cases using the Richards' curve

Speaker: Pierfrancesco Alaimo Di Loro (LUMSA)

Date: Mon 31st January 2022 at 12:00PM

Location: Online

Abstract: We introduce an extended generalized logistic growth model for discrete outcomes, in which spatial and temporal dependence is dealt with the specification of a network structure within an Auto-Regressive approach. We pursue the estimation under the Bayesian framework, using the Stan probabilistic programming language, and use it to model the regional incidence indicators evolution during the first and the second wave of COVID-19 in Italy (i.e. from February 2020 to July 2020 and from July 2020 to December 2020, respectively). A major challenge concerns the specification of the network structure, crucial to consistently estimate the canonical parameters of the generalized logistic curve (e.g. peak time and height). We consider a network based on geographic proximity and one built on historical data of transport exchanges between regions. Interestingly enough, results show that substantial spatial and temporal dependence occurred in both waves, although strong restrictive measures were implemented during the first wave. The prediction performances are verified both within and beyond the observed time window and are substantially improved when space-time independence is accounted for.