Statistical inference of ordinary differential equations

Programa Institucional de Bolsas de Iniciação Científica

PIBIC 2019/2020

Description

Complex physical systems are usually modelled using nonlinear differential equation which provide a rich framework for representing the behaviour of the many interacting variables in a real system. The principle of inverse probability provides an inferential framework for parameter and structure estimation in differential equation models that accounts for the intrinsic uncertainty of the modelling and observation process. This project aims at studying the methods of statistical inference and their applicability to ordinary differential equations.

The mathematical focus is on certain continuous-time Markov processes. The computational focus is on deterministic and stochastic tools for statistical inference. Applications to life-science systems motivate the study. While the research of the project shall be understandable to students who have had an introductory-level exposure to probability and differential equations, the most suitable profile is the student who have also studied Bayesian inference.

If you are interested, get in contact: FRANCESCO.CORONA@UFC.BR

References

[7] Heinonen M, Yildiz C, Mannerström H, Intosalmi J and Lähdesmäki. 2018. Learning unknown ODE models. arXiv:1803.04303.