The Generalized Moment Method for parameters estimate in stochastic fibre processes

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Statistical methods related with stochastic geometries, and in particular with fibre processes, can be applied to address a big set of biomedical problems, ranging from quantifying dose/effect ratios in medical treatments, to automatic diagnosis of pathologies related with the *shape* of the fibre process under study, whose description can be highly complex. In this context, statistical methods based on suitable descriptors of the geometry of the fibre process are needed to compare quantitatively patterns arising in different experimental or pathological conditions, also taking into account spatial heterogeneities of the patterns, which are very frequent in real applications [5].
Fibre processes are also used to model dynamic phenomena like angiogenesis, vasculogenesis, formation of neuronal networks, etc. In such cases some of the stochastic dynamical models available in literature [1, 2] describe the evolution of tips of vessels, coupled with the evolution of some underlying fields of nutrients. The parameters of these models are strictly connected with the geometry of the generated vessels. Statistical techniques for parameter estimation of such models, based on suitable descriptors of the geometry of the fibres, are needed to validate the models themselves.
In this talk we will address some of these problems and provide a parameter estimation method based on a suitable revisitation of the Generalized Moment Method [3, 4]. The properties of the proposed parameter estimators will be studied both theoretically and on simplified simulated test cases.

References

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