

Density Estimates and Some Applications in Statistics

Arturo Kohatsu-Higa

Ritsumeikan University, Shiga, Japan khhs00@fc.ritsumei.ac.jp

In recent years the wide applicability of stochastic differential equations as models for applied sciences has made necessary the development of appropriate technical tools in order to study the behavior of the likelihood function which can not be written explicitly in general. One of these tools is the study of fundamental solutions of partial differential equations. This methodology which is completely analytical can be used although it has serious limitations when developing certain generalizations for driving processes. Malliavin Calculus which was developed in the eighties has been a successful tool in the study of the behavior of densities which can be applied within certain general class of equations. This has led to various studies of the support of the law, the existence and smoothness of the densities, upper and lower bounds for these densities etc.

In recent years, these studies have made possible the study of asymptotic properties of estimators such as the LAN and LAMN properties for estimators of stochastic differential equations driven by Wiener processes. In our exposition, we will give a brief overview of these developments and the possibilities of future developments.

Key Words: density function, maximum likelihood, LAM and LAMN property, Malliavin Calculus