MATHEMATICAL STATISTICS AND FINANCE GROUP

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Since 1990 our group has been studying inference problems related to several application fields: reliability, survival analysis, log-linear models, goodness of fit tests and, more recently, mathematical finance. Our experience and research is mainly in the following topics:

Exponential models: Most of the classical models in Statistics are exponential models. These models have a unified theory that facilitates working with them. We have developed new exponential models related to different applied problems. For instance, we have developed new models in reliability and survival analysis (Castillo and Puig, 1999), new tests for Gamma and Rayleigh distributions (Castillo and Puig, 1997), and new models that generalize the Poisson distribution (Castillo and Pérez, 1998).

High order asymptotic methods: In applied work most of the statistics have moment generation functions. In these cases high order asymptotic methods improve greatly the classical asymptotic theory. We have used these methods in non-regular situations such as, for instance, the case where the parameters are in the boundary of the domain (Castillo and Puig, 1999). New results are now in progress.

Goodness of fit tests: Some goodness of fit tests have been developed in the context of exponential models in Castillo and Puig (1997, 1999). They are smooth tests in the sense that the distribution of interest is imbedded in a model with more parameters. The classical omnibus tests based on the EDF statistics have also been studied. These are especially convenient for location and scale models like the Laplace distribution (Puig and Stephens, 2000). In Puig and Stephens (2001) these tests are developed for the hyperbolic distribution that is usually employed for modelling log-returns in the stock market.

Levy processes and finance: The need for complex models to analyze financial data has produced a big interest in Levy processes. We have developed a Malliavin type calculus for such processes and have applied this to pricing and hedging an European option in a market with jumps (Leon, Solé, Utzet and Vives, 2002).

References

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