AVVISO

Oggetto: **seminari Prof. Emilio Porcu (short corse su processi stocastici spazio-temporali)**

S’informa

che

Il prof. Emilio Porcu (Department of Mathematics, University Federico Santa Maria, Valparaiso, Chile) terrà presso l’aula seminari del Dipartimento di Statistica e Metodi Quantitativi dell’Università degli studi di Milano-Bicocca (stanza 4026) i seguenti quattro seminari:

- Mercoledì 27/01/2016 ore 14:00: " Space-Time covariance functions for planet Earth"

- Mercoledì 27/01/2016 ore 15:15: "Dynamically compactly supported space-time covariance functions"

- Giovedì 28/01/2016 ore 9:00: "Composite Likelihood Approaches for Space-Time Gaussian fields"

- Giovedì 28/01/2016 ore 10:15: "Equivalence of Gaussian measures for some Gaussian fields".

Tutti gli interessati, in particolare i dottorandi di ogni ordine e ciclo, sono invitati a partecipare.

Seguono gli abstract.

1) Wednesday, 27 january 2016 14:00

“Space-Time covariance functions for planet Earth”

Abstract:
In this paper, we propose stationary covariance functions for processes that evolve temporally over a sphere, as well as cross-covariance functions for multivariate random fields defined over a sphere. For such processes, the great circle distance is the natural metric that should be used in order to describe spatial dependence. Given the mathematical difficulties for the construction of covariance functions for processes defined over spheres cross time, approximations of the state of nature have been proposed in the literature by using the Euclidean (based on map projections) and the chordal distances. We present several methods of construction based on the great circle distance and provide closed-form expressions for both spatio-temporal and multivariate cases. A simulation study assesses the discrepancy between the great circle distance, chordal distance and Euclidean distance based on a map projection both in terms of estimation and prediction in a space-time and a bivariate spatial setting, where the space is in this case the Earth. We revisit the analysis of Total Ozone Mapping Spectrometer (TOMS) data and investigate differences in terms of estimation and prediction between the aforementioned distance-based approaches. Both simulation and real data highlight sensible differences in terms of estimation of the spatial scale parameter. As far as prediction is concerned, the differences can be appreciated only when the interpoint distances are large, as demonstrated by an illustrative example.

2) Wednesday, 27 january 2016 15:15

“Dynamically compactly supported space-time covariance functions”

Abstract:
Compactly supported covariance functions have been very popular in geostatistics in the last years. For instance, they are the cornerstone of the covariance tapering technique for both estimation and prediction. Here, we explore compact support in space-time covariance functions. We propose a general class of nonseparable and stationary covariance functions with dynamical temporal support; that is, the compact support in space is a decreasing function of the temporal lag. A special case of our general class is dynamical Wendland functions, which preserve the same properties of the original Wendland functions in space. Specifically, we find that this new class allows for preserving and parameterizing the differentiability at the origin when multiplied with Gneiting functions coupled with a Mat´ern spatial margin. As an application of the proposed class, we explore covariance tapering for estimation in the space-time context using dynamical tapers. In particular, we focus on large datasets with special features (a few spatial location sites and many observations over time and vice versa). The effectiveness of the method is illustrated with a simulation study and by analysing Irish wind speed data.

3) Thursday, 28 january 2016 9:00

“Composite Likelihood Approaches for Space-Time Gaussian fields.”

Abstract
In the recent years there has been a growing interest in proposing covariance models for multivariate Gaussian random field. Some of these covariance models are very flexible and can capture both the marginal and the cross spatial dependence of the components of the associated

multivariate Gaussian random field. However, effective estimation methods for these models are somehow unexplored. Maximum likelihood is certainly a useful tool but it is impractical in all the circumstances where the number of observations is very large. In this work we consider two possible approaches based on composite likelihood for multivariate covariance model estimation. We illustrate through simulation experiments and numerical examples that our methods offer a good balance between statistical efficiency and computational complexity. Asymptotic properties of the proposed estimators are described under increasing domain. Finally we apply the method in analyzing a bivariate dataset on chlorophyll concentration and sea surface temperature in the Chilean coast.

4) Thursday, 28 january 2016 10:15

“Equivalence of Gaussian measures for some Gaussian fields”

Abstract

Equivalence of Gaussian measures represent the key for understanding optimal prediction under infill asymptotics. We show that some covariance functions are compatible with the Matérn class according to Yadrenko's theory. We analyze the implications from the point of view of optimal prediction.