12th CI²MA Focus Seminar
"Recent Advances in Statistical Modeling and Computational Methods"
Supported by Departamento de Estadística, CI²MA
and Fondecyt 1130233.

January 17, 2016
Room FM 101, 1st floor
Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción

Organizer: Mauricio Castro

Programme

15.10 **Opening**

15.15 **Guillermo Ferreira** (Departamento de Estadística, UdeC, Chile):
Kalman filtering for spatio-temporal statistics

15.50 **Jorge González** (Departamento de Estadística, PUC, Chile):
Statistical modeling for the comparison of test scores

16.25 **Gabriel Arriagada** (INCAR, UdeC, Chile):
Application of statistical methods in epidemiology

16.55 **COFFEE BREAK**

17.15 **Garritt Page** (Department of Statistics, BYU, USA):
Spatial product partition models

17.50 **Alejandro Jara** (Departamento de Estadística, PUC, Chile):
Regression modeling of misclassified clustered interval-censored data

18.25 **Conclusions and floor discussion**

20.30 **Seminar Dinner**

Practical information

Seminar participants who would like to join dinner should register with CI²MA secretary:

Ms Angelina Fritz, CI²MA
E-mail: afritz@ci2ma.udec.cl, Phone: (041) 2661324

12th CI^{2}MA Focus Seminar
Recent Advances in Statistical Modeling and Computational Methods
Universidad de Concepción, January 17, 2017
Supported by CI^{2}MA and Fondecyt 1130233

KALMAN FILTERING FOR SPATIO-TEMPORAL STATISTICS

GUILLERMO P. FERREIRA

Abstract. This work provides an overview of Kalman filter algorithm in spatio-temporal processes, a powerful methodology for handling observations coupled both in time and space. These techniques allow us to capture the temporal dependence as well as the spatial correlation structure through the well-known state-space equations. This work also reviews estimation and predictions techniques, illustrating the application of these methods using real-life data examples. The examples show that the Kalman filter methods provide a useful theoretical and practical framework for the statistical analysis of spatio-temporal data.

Departamento de Estadística, Universidad de Concepción, Chile
E-mail address: gferreir@udec.cl

12th CI^{2}MA Focus Seminar
Recent Advances in Statistical Modeling and Computational Methods
Universidad de Concepción, January 17, 2017
Supported by CI^{2}MA and Fondecyt 1130233

STATISTICAL MODELING FOR THE COMPARISON OF TEST SCORES

JORGE GONZÁLEZ

Abstract. A particular statistical problem in the field of educational measurement relates to the comparability of scores arising from different test forms. Such problem is called *equating*. Equating is a family of statistical models and methods that are used to make test scores comparable among two or more versions of a test which are intended to measure the same attribute. In this talk, I will discuss about the role of random variables, probability distributions and parameters as involved in equating, and on the possibility of going towards a formal statistical modeling framework for equating.

Departamento de Estadística, Pontificia Universidad Católica de Chile, Chile
E-mail address: jorge.gonzalez@mat.uc.cl

12th CI^{2}MA Focus Seminar
Recent Advances in Statistical Modeling and Computational Methods
Universidad de Concepción, January 17, 2017
Supported by CI^{2}MA and Fondecyt 1130233

APPLICATION OF STATISTICAL METHODS IN EPIDEMIOLOGY

GABRIEL ARRIAGADA

Abstract. In this talk I will present my experience on how statistics may help to answer epidemiological questions in the context of diseases of aquatic animals. Epidemiology studies patterns, causes and effects of conditions of heath and disease in populations. It identifies exposures and assesses associations with various outcomes such as health, welfare, productivity, etc., so one can take advantage of that knowledge to improve these population parameters. Exposures and outcomes are part of complex causal webs. Epidemiologists (with the help of statistics) are constantly improving their study designs and data analyses in order to describe these causal webs in a more realistic way. In this presentation I will show some applications of linear mixed models, GLMM, and spatial statistics to the problem of sea lice, which is a parasite that causes important economic losses to the salmon industry in Chile and other countries. Projects involving Bayesian hierarchical models and data mining will be presented as well.

Interdisciplinary Center for Aquaculture Research (INCAR), Universidad de Concepción, Chile
E-mail address: garriagada@oceanografia.udec.cl

12th CI^{2}MA Focus Seminar
Recent Advances in Statistical Modeling and Computational Methods
Universidad de Concepción, January 17, 2017
Supported by CI^{2}MA and Fondecyt 1130233

SPATIAL PRODUCT PARTITION MODELS

GARRITT PAGE

Abstract. When modeling geostatistical or areal data, spatial structure is commonly accommodated via a covariance function for the former and a neighborhood structure for the latter. In both cases the resulting spatial structure is a consequence of implicit spatial grouping in that observations near in space are assumed to behave similarly. It would be desirable to develop spatial methods that explicitly model the partitioning of spatial locations providing more control over resulting spatial structures and be able to better balance local and global spatial dependence. To this end, we extend product partition models to a spatial setting so that the partitioning of locations into spatially dependent clusters is explicitly modeled. We explore the resulting spatial structure and demonstrate its flexibility in accommodating many types of spatial dependencies. We illustrate the method's utility through an education application.

Department of Statistics, Brigham Young University, USA
E-mail address: page@stat.byu.edu

12th CI^{2}MA Focus Seminar
Recent Advances in Statistical Modeling and Computational Methods
Universidad de Concepción, January 17, 2017
Supported by CI^{2}MA and Fondecyt 1130233

REGRESSION MODELING OF MISCLASSIFIED CLUSTERED INTERVAL-CENSORED DATA

ALEJANDRO JARA

Abstract. Motivated by a longitudinal oral health study, we propose a modelling approach for clustered time-to-event data, when the response of interest can only be determined to lie in an interval obtained from a sequence of examination times and the determination of the occurrence of the event is subject to misclassification. The clustered time-to-event data are modelled using an accelerated failure time model with random effects and by assuming a penalised Gaussian mixture model for the random effects terms to avoid restrictive distributional assumptions. A general misclassification model is discussed in detail, considering the possibility that different examiners were involved in the assessment of the occurrence of the events for a given subject across time. We additionally provide empirical evidence showing that the model can be used to estimate the underlying time-to-event distribution and the misclassification parameters without any external information about the latter parameters. We also provide results of a simulation study.

Departamento de Estadística, Pontificia Universidad Católica de Chile, Chile
E-mail address: ajara@mat.puc.cl

Joint work with M.J. Garca Zattera and A. Komarek. A. Jara's research is supported by Fondecyt grant 1141193. M.J. Garcia-Zattera's research is supported by Fondecyt grant 11110033.