

## Functional Boxplots for Visualization of Complex Curve/Image Data: An Application to Precipitation and Climate Model Output

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Thursday, 20<sup>th</sup> June 2013

12:30pm Room 3-E4-SR03 Via Röntgen 1 Milano

### Abstract

In many statistical experiments, the observations are functions by nature, such as temporal curves or spatial surfaces/images, where the basic unit of information is the entire observed function rather than a string of numbers. For example the temporal evolution of several cells, the intensity of medical images of the brain from MRI, the spatio-temporal records of precipitation in the U.S., or the output from climate models, are such complex data structures. Our interest lies in the visualization of such data and the detection of outliers. With this goal in mind, we have defined functional boxplots and surface boxplots based on the center outwards ordering induced by band depth for functional data or surface data. We illustrate the construction of a functional boxplot on a series of sea surface temperatures related to the El Nino phenomenon and its outlier detection performance is explored by simulations. As applications, the functional boxplot is demonstrated on spatio-temporal U.S. precipitation data for nine climatic regions and on climate general circulation model (GCM) output. Further adjustments of the functional boxplot for outlier detection in spatio-temporal data are discussed as well. The talk is based on joint work with Ying Sun.

Department of Decision Sciences

Statistics Seminar

## Paradigms for a 21st Century University

Bocconi

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### **Abstract**

KAUST is a graduate research institution, founded in 2009 by King Abdullah of Saudi Arabia, with research thrusts in energy, environment, food, and water for a sustainable planet, and supporting thrusts in core capabilities (modeling, simulation, analytics, software, and hardware). As a 45-sq km international academic village on the shores of the Red Sea, created to be a 21st century "House of Wisdom" in the tradition of the ninth century Bayt al Hikmah that gave the world some of its modern mathematics, physics, chemistry, and medicine, KAUST has been endowed with world-class facilities and has recruited a world-competitive research faculty. KAUST awards degrees in Applied Mathematics and Computational Science, Bioscience, Chemical Science, Chemical and Biological Engineering, Computer Science, Earth Science and Engineering, Electrical Engineering, Environmental Science and Engineering, Marine Science, Materials Science and Engineering, and Mechanical Engineering. Currently, KAUST enrolls about 800 students from about 60 different countries. The language of instruction is English. KAUST is co-educational and is established upon principles of intellectual freedom, non-discrimination, and merit-based promotion. For Fall 2013, KAUST seeks ambitious, academically talented, and highly motivated doctoral and master's candidates in sustainable technologies and the enabling sciences from the worlds leading institutions to participate in discovery and translation into start-up enterprises. The speaker will present KAUST's programs and take questions about life in today's Middle East and about starting a university from scratch.