Special Section on Statistics of Time Warpings and Phase Variations

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Topic of the Special Section

Phase variation is pervasive in data distributed over continua, and constitutes for instance an ubiquitous issue in functional data analysis. A considerable variety of methods for decoupling and analyzing amplitude and phase variation now exist, and connections with shape analysis methods have been made.

This Special Issue aims to compare the available methods, review progress to date and consider new research opportunities in this area, disseminating the work presented at the workshop on “Statistics of Time Warpings and Phase Variations” (http://mbi.osu.edu/2012/stwdescription.html), hosted and funded by the Mathematical Biosciences Institute, Ohio. The workshop had a rather unusual structure. About 15 international groups with different expertise have been invited to participate to the workshop, each group lead by experts in this field and also composed by young researchers. These analytic groups were asked to analyze, before the workshop, four selected data sets, and present their results at the workshop. The workshop activities have hence been centered around the analysis of four agreed upon data sets, applying a wide variety of statistical methods for separating phase and amplitude variability. The workshop was a great success, with enthusiastic participation by the various analytic groups, who put much effort in the analysis of the data. Lots of important discussions arose from the presentations of the analysis results. The strengths and weaknesses of the various methods have been deeply debated. Very promising novel analytic ideas have been proposed.

The Special Section collects and disseminates this work. It is structured similarly to the workshop, i.e., organized in four paper collections, each dedicated to one of the four driving applications with an introductive paper dedicated to a description of the dataset, followed by contributions by the analytic groups where the various proposed methods are tested and compared on that dataset. The Special Section also features an editorial paper, explaining this effort and giving a brief overview of the literature.
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