

International Workshop on Perspectives on High-dimensional Data Analysis III

May 22-25, 2013

Held at the Pacific Institute of Mathematical Sciences, Vancouver, BC, Canada

This workshop went very smooth and was a huge success. It turned out the budget of the workshop was well planned ahead by chair of the organizing committee resulting in savings. He made a site visit prior to workshop for this purpose. We were told that registration revenue from this workshop will be remit to organizers to use for the future workshop. We are waiting for a formal response on this matter.

Besides domestic participants, it had attracted many international participants from USA, and some other countries. Many participants at end of the workshop had indicated their interest to take part in a future workshop of a similar type to further discuss research progress in these research areas, and we are planning to do so!

Many modern scientific investigations require the analysis of high dimensional data. Examples include genomic and proteomic data, spatial-temporal data, network data, and many others. Simultaneous variable selection and parameter estimation play a central role in such investigations. There is now an immense literature on variable selection, and penalized regression methods are becoming increasingly popular. Much new development has been published in recent years by leading statistical journals. The application of linear regression models for high-dimensional data analysis is a challenging task. Regularization techniques, such as adaptive penalized least-squares, have attracted much attention in the literature. Penalized regression is a technique for mitigating difficulties arising from collinearity and high-dimensionality. This approach necessarily incurs an estimation bias, while reducing the variance of the estimator. A tuning parameter is needed to adjust the effect of the penalization so that a desirable balance between model parsimony and goodness-of-fit can be achieved. Different forms of penalty functions have been studied intensively over the last 10-15 years. Examples include the LASSO and its many variants (such as adaptive LASSO, group LASSO, relaxed LASSO, and so on), the SCAD, the Dantzig selector, and the elastic net, to name just a few. More recently, some of these penalization/regularization techniques have been extended to deal with the estimation of large covariance matrices, and the analysis of complex dependence structures such as networks and graphs.

The purpose of the Workshop was to stimulate research in an informal setting, and to foster the interaction of researchers in the arena of High-dimensional Data Analysis. This workshop hopes to provide a venue for participants to meet leading researches of this field in a small group in order to maximize the chance of interaction and discussion. The objectives include: (1) to highlight and expand the breadth of existing methods in high-dimensional data analysis and their potential for the advance of both mathematical and statistical sciences, (2) to identify important directions for future research in the theory of regularization methods, in algorithmic development, and in methodology for different application areas, (3) to facilitate collaboration between theoretical and subject-area researchers, and (4) to provide opportunities for highly qualified personnel to meet and interact with leading researchers from countries around the world.

This workshop has successfully fulfilled the agenda of promoting research activities in the area of high-dimensional data analysis. It has created a rather focused venue for participants to actively discuss and exchange research ideas via presentations and post-presentation informal discussions. The list of speakers at the workshop was really impressive, and most of talks were based on unpublished and on-going work. There were a significant proportion of Canadian speakers, who

had been given these opportunities to develop future collaborations among them and with researchers from other countries.

The keynote speech was of the highest quality. This talk has updated us the progress of research in this field, and pitched out open problems to motivate young researchers for promising research directions. In addition, 35 invited talks were presented by influential researchers on various aspects of High-dimensional Data Analysis and were well received by the audience. Most of presentations had followed with insightful comments and interesting discussions. These talk open many new research problems in a host of applications.

A poster session was also organized during reception time to showcase the recent work of graduate students. This was also well attended. Participants had active exchanges ideas and in-depth discussion on current research activities and future research directions.

In conclusion, this workshop has achieved the following goals: (1) Presentations have highlighted new methodology development and extensions of existing methods in high-dimensional data analysis, (2) through both presentations and discussions researchers have identified important directions for future research such as experiment design for high-dimensional data collection, algorithmic problems in protein folding, and new problems of regularization methods, (3) researchers have made extensive discussion on collaborations and hope to meet again in the next year to exchange results once again, and (4) the workshop has provided a broad range of research problems and up-to-date information for highly qualified personnel who have benefitted in a great deal by meeting and interacting with leading researchers.

There were 61 participants from Canada, United States, Europe and Asia, and at least 15 of them were graduate students and postdocs.

We would like to express our thanks to the staff and management at PIMS for the encouragement and support in the organization of this workshop.

Respectfully submitted by

S. Ejaz Ahmed, chair organizing committee

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