# 讲者介绍及报告摘要

## 主题报告 1

### Using Dominance to Harness the Complexity of Big Data Applications

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### 讲者介绍 Biography

Professor Wah is the Provost and Wei Lun Professor of Computer Science and Engineering at the Chinese University of Hong Kong. Professor Wah is the Franklin W. Woeltge Emeritus Professor of Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign, and is a prominent computer scientist, with expertise in non-linear programming, multimedia signal processing and artificial intelligence. He is a fellow of the Institute of Electrical and Electronics Engineers, the Association for Computing Machinery, and the American Association for the Advancement of Science. Professor Wah has received numerous international honours and awards for his achievements. Among these are the Distinguished Alumni Award in Computer Science of the University of California, Berkeley, the W. Wallace McDowell Award, the Tsutomu Kanai Award and the Richard E. Merwin Distinguished Service Award of the IEEE Computer Society.

Professor Wah was a member of the Research Grants Council (RGC) of the University Grants Committee (UGC) in Hong Kong between 2005 and 2009, and served as the Chairman of its Engineering Panel between 2006 and 2009. He has been appointed the Chairman of RGC since January 2013 and is currently a member of various UGC Sub-Committees and the Deputy Convener of the RAE Group. He also serves on the Innovation and Technology Advisory Committee of the Hong Kong Trade Development Council as well as the Committee on Innovation, Technology and Re-industrialisation of the HKSAR Government. In May 2019, he was invited to serve as a Council Member of Hong Kong Applied Science and Technology Research Institute (ASTRI) University Advisory Council (AUAC).

### 报告摘要 Abstract

Big Data is emerging as one of the hottest multi-disciplinary research fields in recent years. Big data innovations are transforming science, engineering, medicine, healthcare, education, finance, business, and ultimately society itself. However, as their data space is so vast that it is infeasible to scan the data once, we must focus our search on promising subspaces. We introduce the concept of kernels that represent solution density in a subspace. To avoid scanning through the entire data, we prune inferior subspaces with a small kernel using some dominance relations between subspaces $P_i$ and $P_j$. In this case, when $P_i$ dominates $P_j$, we can prune $P_j$ because we can guarantee that the kernel in $P_j$ cannot be better than that in $P_i$, without search both subspaces. This approach is significantly more effective than heuristic pruning, which does not provide such guarantees. For illustration, we present the learning and generalization of methods for identifying subspaces with high daily returns in financial applications, and the identification of regions with high perceptual quality in interactive multimedia.