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Preface

The twenty-first century is a visual century. With the advent of Industry 4.0 or Fourth Industrial Revolution (4IR), visual informatics has become a crucial aspect of computer science. Specifically, it is a multidisciplinary field of computer science, information technology, and engineering, which integrates areas such as computer vision, image processing, pattern recognition, computer graphics, simulation, virtual reality, data visualization and analytics, cyber security as well as social computing, applied in various knowledge domains such as education, medical and health, finance, agriculture, and security. The Institute of Visual Informatics (IVI), Universiti Kebangsaan Malaysia (UKM) – or The National University of Malaysia – is a centre of excellence (CoE) established as an outcome of the First Visual Informatics Conference (IVIC) held in 2009. The institute, which conducts research in the aforementioned basic areas, conducts master's and doctoral (PhD) degree programs by research, as well as short professional practical certifications currently in the areas of data science and visual analytics. The institute has successfully graduated five master's and 28 PhD students since its inception in 2010 through 2017. We are indeed indebted to the international fraternity from the last four IVIC conferences (2009, 2011, 2013, and 2015), who have given us support that has resulted in the establishment of the institute. Our smart partnerships, through this conference, will not only help the institute to grow but will enhance research in this area internationally that can be applied by private organizations and governments in the respective countries.

The Visual Informatics Research Group and the Institute of Visual Informatics (IVI) at UKM once again hosted this 5th International Visual Informatics Conference (IVIC 2017), with the objective of bringing together experts to discuss and share new knowledge and ideas in this research area so that more concerted efforts can be undertaken nationally and globally. Like the previous IVIC conferences, this conference was conducted collaboratively by the visual informatics fraternity from various public and private universities and industry from different parts of the world. This fifth conference was co-sponsored by MyVIC Sdn. Bhd. (a local private company), the ICT Cluster of the National Council of Professors (MPN), the Malaysian Information Technology Society (MITS), the Malaysian Research Education Network (MyREN), the Malaysian Digital Economy Corporation (MDeC), the Malaysian Communications and Multimedia Commission (MCMC), and the Malaysian Administrative Modernization Planning Unit (MAMPU). The conference was co-chaired by six professors from UK, Ireland, Spain, Japan, Taiwan, and Malaysia.

The theme of the conference, "Visual Informatics: Changing Landscapes in 4IR Through Data-Driven Decisions" reflects the importance of big data in this fourth industrial revolution digital economy. It also portrayed the belief of the organizers (both locally and globally) of the importance of open data and sharing of big data and analytics, which would lead to the creation and innovation of new products through data-driven decisions. The changing landscapes of industry 4.0 (4IR) require

data-driven decisions be made, based on big data analytics that would allow for more comprehensive and accurate visual insights, for more précise predictions of data that would result in an efficient data-driven decision-making for economic and social good. Thus, the theme of the conference was relevant, apt, and timely.

The conference focused on four tracks — Visualization and Data-Driven Technology, Engineering and Data-Driven Innovation, Data-Driven Societal Well-Being and Applications, and Data-Driven Cyber Security — which lasted for two days (November 28 and 29, 2017) and ended with a one-day workshop (November 30, 2017). There were five keynote speakers and 68 paper presentations based on topics covered by the four main tracks. The reviewing of the papers was conducted by experts who represented the Program Committee from Asia, Europe, Oceania, and USA. Each paper was reviewed by three reviewers and the acceptance rate was 51%. The reviewing process was managed using EasyChair.

The conference also included the first meeting of a national task force on big data represented by stakeholders from the private sector, academia, and government agencies in Malaysia. The objective of the task force is to consolidate big data and big data analytics initiatives, and help the government in formulation of policies relating to BD, BDA, as well as open data. The conclusion and recommendations made by the task force will be submitted to the appropriate governing body.

On behalf of the Organizing and Program Committee of IVIC 2017, we thank all authors for their submissions and camera-ready copies of papers, and all participants for their thought-provoking ideas and active participation in the conference. We also thank the vice-chancellor of UKM (host university), and the vice-chancellors and deans of all IT faculties of the IHLs for their support in organizing this conference. We also acknowledge the sponsors, members of the Organizing Committees, Program Committee members, support committees, and individuals who gave their continuous help and support in making the conference a success. IVIC has grown from strength to strength and it is our fervent hope that it can one day be held in different host countries in Asia, Europe, Oceania, the UK or the USA.

November 2017

Halimah Badioze Zaman
Peter Robinson
Alan Smeaton
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Tada Terutoshi
Azizah Jaafar
Nazlena Mohamad Ali

Organization

The 5th International Visual Informatics Conference (IVIC 2017) was organized by the Visual Informatics Research Group and Institute of Visual Informatics, Universiti Kebangsaan Malaysia (UKM), in collaboration with 18 local public and private universities in Malaysia, the Malaysian Information Technology Society (MITS), the Multimedia Development Corporation (MDeC), the Malaysian Research Educational Network (MyREN), and the ICT Cluster of the National Professors' Council (MPN).

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