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IFIP was founded in 1960 under the auspices of UNESCO, following the first World Computer Congress held in Paris the previous year. A federation for societies working in information processing, IFIP's aim is two-fold: to support information processing in the countries of its members and to encourage technology transfer to developing nations. As its mission statement clearly states:

*IFIP is the global non-profit federation of societies of ICT professionals that aims at achieving a worldwide professional and socially responsible development and application of information and communication technologies.*

IFIP is a non-profit-making organization, run almost solely by 2500 volunteers. It operates through a number of technical committees and working groups, which organize events and publications. IFIP's events range from large international open conferences to working conferences and local seminars.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is generally smaller and occasionally by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

IFIP distinguishes three types of institutional membership: Country Representative Members, Members at Large, and Associate Members. The type of organization that can apply for membership is a wide variety and includes national or international societies of individual computer scientists/ICT professionals, associations or federations of such societies, government institutions/government related organizations, national or international research institutes or consortia, universities, academies of sciences, companies, national or international associations or federations of companies.

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Zhongzhi Shi · Eunika Mercier-Laurent  
Jiuyong Li (Eds.)

# Intelligent Information Processing IX

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# Preface

This volume comprises the papers collected in the 10th IFIP International Conference on Intelligent Information Processing. As the world proceeds quickly into the Information Age, it encounters both successes and challenges, and it is well recognized that intelligent information processing provides the key to solve many challenges in the Information Age. Intelligent Information Processing supports the most advanced techniques that are able to change human life and the world. However, the path to the success is never a straight one. Every new technology brings with it many challenging problems, and researchers are in great demand to tackle the challenging problems. This conference provides a forum for engineers and scientists in research institutes, universities, and industries to report and discuss their latest research progresses in all aspects of intelligent information processing.

We received more than 80 papers, of which 37 papers are included in this volume as regular papers and 8 as short papers. All submitted papers were reviewed by at least two reviewers. We are grateful for the dedicated work of both authors and reviewers.

A conference such as this cannot succeed without the help of many individuals who contributed their valuable time and expertise. We want to express our sincere gratitude to the Program Committee members and reviewers, who invested many hours for reviews and deliberations. They have provided detailed and constructive review comments that have significantly improved the quality of the papers included in this volume.

We are very grateful to have the sponsorship of the following organizations: IFIP TC12, Guangxi University, and Institute of Computing Technology, Chinese Academy of Sciences. We would like to specially thank Cheng Zhong and Zuqiang Meng for organizing the conference and Xin Hong for carefully checking the proceedings.

Finally, we hope you find this volume inspiring and informative. We wish that the research results reported in the proceedings will bear fruit over the years to come.

August 2018

Zhongzhi Shi  
Eunika Mercier-Laurent  
Jiuyong Li

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# **Keynote and Invited Presentations**

# Advances in Transfer Learning

QiangYang

Chair Professor at Computer Science and Engineering Department,  
Hong Kong University of Science and Technology, China

**Abstract.** Transfer learning aims to leverage knowledge from existing tasks to solve new tasks. In this talk, I will give an overview of recent advances of transfer learning and point to future works that both have practical significance and theoretical potential.



# Grounding and Learning About Human Environments and Activities for Autonomous Robots

Anthony G. Cohn

Director of Research and Innovation, School of Computing,  
University of Leeds, Leeds, LS2 9JT, UK  
Distinguished Visiting Professor at Tongji University

**Abstract.** With the recent proliferation of human-oriented robotic applications in domestic and industrial scenarios, it is vital for robots to continually learn about their environments and about the humans they share their environments with. In this paper, we present a novel, online, incremental framework for *unsupervised* symbol grounding in real-world, human environments for autonomous robots. We demonstrate the flexibility of the framework by learning about colours, people names, usable objects and simple human activities, integrating state-of-the-art object segmentation, pose estimation, activity analysis along with a number of sensory input encodings into a continual learning framework. Natural language is grounded to the learned concepts, enabling the robot to communicate in a human-understandable way. We show, using a challenging real-world dataset of human activities as perceived by a mobile robot, that our framework is able to extract useful concepts, ground natural language descriptions to them, and, as a proof-of-concept, generate simple sentences from templates to describe people and the activities they are engaged in.

# Artificial Intelligence Overview and Impacts

Eunika Mercier-Laurent

University of Reims Champagne-Ardenne,  
Saint Drezero, France

**Abstract.** The recent craze for AI and limitation to data, deep learning and chat bots cover only a very small part of AI patrimony. Facing various and difficult challenges requires knowing the whole spectrum in aim to select the best approach and techniques. Environmental impact and climate change can be easily faced by right AI and alternative thinking. Smart software (and hardware) conceived using eco-design approach have a potential to reduce our impact and bring a contribution to the Planet protection.

# Is Knowledge Engineering Out-of-Date?

Yueting Zhuang

Dean of College of Computer Science,  
Zhejiang University

**Abstract.** The world is now in the era of a new wave AI technology. Though, many of us still remembered the days when knowledge Engineering along with expert system was extremely hot, in such a state that is similar to deep learning or machine learning nowadays. This talk will first give a short survey of AI, especially the concept of knowledge Engineering, rule-based expert system, and so on, and then introduce the data-driven machine learning approaches used in systems like Wikipedia, Freebase, Google Knowledge Graph etc. It will conclude that knowledge engineering is NOT out-of-date. What indeed outdated is the method of knowledge acquisition. Finally it will introduce knowledge computing engine in order to support knowledge engineering.

# Deep Learning Based Image Interpretation

Lichen Jiao

School of Artificial Intelligence at Xidian University,  
Xi'an, China

**Abstract.** With the development of sensor and data storage technology, the data acquisition becomes easier, but it brings “big data” problems, of which, Images are the most common information sources in daily life. Compared with other information sources, the images contain huge amounts of information, and its complexity, redundancy and other characteristics distinguish it from other information sources. The image processing is relatively difficult, and the human visual system has shown excellent capabilities in image processing, which attracting the attention of many researchers. The application of deep learning model in recent years has made a new progress in the study of deep neural networks and brought a new research boom.

# Effective Utilization of Genomic Data

Yadong Wang

School of Computer Science and Technology,  
Harbin Institute of Technology, China

**Abstract.** With the rapid development and wide application of high-throughput genome sequencing technology, a series of large scale international genomics study plans have been carried out. This makes an explosive and continuous growth of genomics data, and the in depth integration of genomics data and healthcare data, which triggers a “data revolution” in life science.

Nowadays, the effective use of genomics data has become an engine critical to the development of life science as well as other related fields such as healthcare, medicine, drug development, etc. Genomics data has large volume, various data structures and complex relationships, which makes it difficult to effectively analyze and utilize. State of the art genomics data analysis technologies can merely dig out 30–50% of the value of the data, i.e., the large potentials of the data cannot be fully realized. This has been one of the biggest challenges to genomics and bioinformatics.

The drawbacks of the existing analysis approaches, including (but not limited to) low sensitivity, low accuracy, low consistency, low efficiency, etc., are the bottlenecks to the effective use of genomics data. It is the main way to solve these problems by developing advanced bioinformatics algorithms, to continuously improve the quality and efficiency of data analysis. Centers for Bioinformatics of Harbin Institute of technology have made great efforts in recent years to develop a batch of innovative genomics data analysis algorithms and systems. These algorithms and systems substantially improve their performances for a series of fundamental genomics data analysis, such as sequencing read alignment, variant calling and genomics big data visualization. With these achievements, several technical bottlenecks have been breakthrough, which make large contributions to the effective use of genomics.

# Contents

## Machine Learning

Public Opinion Clustering for Hot Event Based on BR-LDA Model . . . . .	3
<i>Ningning Ni, Caili Guo, and Zhimin Zeng</i>	
Improved Ensemble Extreme Learning Machine Regression Algorithm . . . . .	12
<i>Meiyi Li, Weibiao Cai, and Xingwang Liu</i>	
A $K$ -AP Clustering Algorithm Based on Manifold Similarity Measure . . . . .	20
<i>Hongjie Jia, Liangjun Wang, Heping Song, Qirong Mao, and Shifei Ding</i>	
Multi-view Restricted Boltzmann Machines with Posterior Consistency . . . . .	30
<i>Ding Shifei, Zhang Nan, and Zhang Jian</i>	
Mass-Based Density Peaks Clustering Algorithm . . . . .	40
<i>Ding Ling and Xu Xiao</i>	

## Deep Learning

Forward Learning Convolutional Neural Network . . . . .	51
<i>Hong Hu, Xin Hong, Dan Yang Hou, and Zhongzhi Shi</i>	
A Deep Learning Approach Based on CSP for EEG Analysis. . . . .	62
<i>Wenchao Huang, Jinchuang Zhao, and Wenli Fu</i>	
Automatic Driving Decision Algorithm Based on Multi-dimensional Deep Space-Time Network. . . . .	71
<i>Jianguo Zhang, Jianghua Yuan, Hanzhong Pan, Qing Ma, and Yong Yu</i>	
Tourist Attraction Recommendation Based on Knowledge Graph . . . . .	80
<i>Phatpicha Yochum, Liang Chang, Tianlong Gu, Manli Zhu, and Weitao Zhang</i>	

## Multi-agent System

Elite Opposition-Based Selfish Herd Optimizer . . . . .	89
<i>Shengqi Jiang, Yongquan Zhou, Dengyun Wang, and Sen Zhang</i>	
The Effects of Fixed-Strategy Agents on Local Convention Emergence in Multi-agent Systems . . . . .	99
<i>Tim Borglund, Shuyue Hu, and Ho-Fung Leung</i>	

A Multi-agent Framework that Facilitates Decoupled Agent Functioning . . . .	109
<i>Dave J. Russell and Elizabeth M. Ehlers</i>	

Design and Implementation of Smart Home Cloud System Based on Kinect . . . . .	120
<i>Xuebin Tang, Jinchuang Zhao, Wenbei Li, and Bin Feng</i>	

**Neural Computing and Swarm Intelligence**

Attribute Grid Computer Based on Qualitative Mapping for Artificial Intelligence . . . . .	129
<i>Jiali Feng</i>	

A Byproduct of a Differentiable Neural Network—Data Weighting from an Implicit Form to an Explicit Form . . . . .	140
<i>Tongfeng Sun</i>	

A Simplex Method-Based Salp Swarm Algorithm for Numerical and Engineering Optimization. . . . .	150
<i>Dengyun Wang, Yongquan Zhou, Shengqi Jiang, and Xin Liu</i>	

Energy Conservation for Wireless Mesh Networks: A PSO Approach with Throughput-Energy Consumption Scheme Using Solar Energy . . . . .	160
<i>Zhe Wang, Taoshen Li, Jin Ye, and Zhihui Ge</i>	

**Natural Language Processing**

Short Text Feature Extraction via Node Semantic Coupling and Graph Structures . . . . .	173
<i>Huifang Ma, Xiaoqian Liu, Lan Ma, and Yulin Hu</i>	

PWA-PEM for Latent Tree Model and Hierarchical Topic Detection . . . . .	183
<i>Zhuchen Liu, Hao Chen, Jie Li, and Yanhua Yu</i>	

Improved Louvain Method for Directed Networks. . . . .	192
<i>Lei Li, Xiangchun He, and Guanghui Yan</i>	

A Detail Preserving Vector Median Filter Based on Texture Analysis . . . . .	204
<i>Ying Pan and Shihui Wang</i>	

**Recommendation System**

A DeepWalk-Based Approach to Defend Profile Injection Attack in Recommendation System . . . . .	213
<i>Xu Gao, Wenjia Niu, Jingjing Liu, Tong Chen, Yingxiao Xiang, Xiaoxuan Bai, and Jiqiang Liu</i>	

An Improved Recommender for Travel Itineraries . . . . .	223
<i>Yajie Gu, Jing Zhou, and Shouxun Liu</i>	
Constrained Probabilistic Matrix Factorization with Neural Network for Recommendation System . . . . .	236
<i>Guoyong Cai and Nannan Chen</i>	
Cooperative Filtering Program Recommendation Algorithm Based on User Situations and Missing Values Estimation . . . . .	247
<i>Jian Dong, Ruichun Tang, and Geqiang Lian</i>	

**Social Computing**

Towards a Modeling Framework of Social Contexts, Roles and Relations for Acquiring Role-Specific Rules . . . . .	261
<i>Ya Wang, Zhenzhen Gu, Yuefei Sui, and Cungen Cao</i>	
Microblog Hot Event Detection Based on Restart Random Walk and Modularity . . . . .	274
<i>XiaoHong Li, JiHeng Gong, Yuyin Ma, HuiFang Ma, and Na Qin</i>	
Immersive Virtual Reality Utilizing Hand Gesture Capture as a Replacement for Traditional Controls . . . . .	284
<i>James L. Gibson and Duncan Anthony Coulter</i>	
Using System Dynamics for Predicting an Organization's Procurement Performance. . . . .	294
<i>M. H. Abolbashari, A. Zakeri, and E. Chang</i>	

**Business Intelligence and Security**

A Ciphertext-Policy Attribute-Based Encryption Based on Multi-valued Decision Diagram . . . . .	303
<i>Shaowei Zhang, Long Li, Liang Chang, Tianlong Gu, and Huadong Liu</i>	
KPI Data Anomaly Detection Strategy for Intelligent Operation and Maintenance Under Cloud Environment. . . . .	311
<i>Youchang Xu, Ningjiang Chen, Ruwei Huang, and Hanlin Zhang</i>	
A Customer Segmentation Model Based on Affinity Propagation Algorithm and Improved Genetic K-Means Algorithm . . . . .	321
<i>Meiyang Zhang, Zili Zhang, and Shi Qiu</i>	
Personal Credit Risk Assessment Based on Stacking Ensemble Model. . . . .	328
<i>Maoguang Wang, Jiayu Yu, and Zijian Ji</i>	



**Pattern Recognition**

A Replay Speech Detection Algorithm Based on Sub-band Analysis . . . . .	337
<i>Lang Lin, Rangding Wang, and Yan Diqun</i>	
Hybrid Pyramid U-Net Model for Brain Tumor Segmentation. . . . .	346
<i>Xiangmao Kong, Guoxia Sun, Qiang Wu, Ju Liu, and Fengming Lin</i>	
Image Semantic Description Based on Deep Learning with Multi-attention Mechanisms . . . . .	356
<i>Jian Yang and ZuQiang Meng</i>	
Bayesian Linear Regression Model for Curve Fitting . . . . .	363
<i>Michael Li</i>	

**Image Understanding**

A Texture Synthesis Steganography Scheme Based on Super-Pixel Structure and SVM . . . . .	375
<i>Weiyi Wei, Chengfeng A, Lizhao Wang, and Huifang Ma</i>	
The Design and Implementation of the Curved Road Radar Early-Warning System. . . . .	384
<i>Jun Wen, Guoen Wei, and Runfa Zhu</i>	
Application of Skin Color Model in Image Segmentation. . . . .	394
<i>Wei Wei, Tianyong Li, Jinfu Wei, Detian Zen, and Weimin Ning</i>	
Gait Recognition Based on EMG Information with Multiple Features . . . . .	402
<i>Yueying Cao, Farong Gao, Liling Yu, and Qingshan She</i>	
A Web-Based Platform for Segmentation of Abdominal Organs on CT Images. . . . .	412
<i>Xiaoxia Ning, Xuejun Zhang, and Qianmei Yang</i>	
An Insider Threat Detection Method Based on User Behavior Analysis . . . . .	421
<i>Wei Jiang, Yuan Tian, Weixin Liu, and Wenmao Liu</i>	
Obstacle Detection and Tracking Based on Multi-sensor Fusion . . . . .	430
<i>Shuyao Cui, Dianxi Shi, Chi Chen, and Yaru Kang</i>	
Non-uniform Noise Image Denoising Based on Non-local Means . . . . .	437
<i>Jiaxin Li, Jing Hu, Min Wei, Bin Zhang, and Yanfang Wang</i>	
<b>Author Index . . . . .</b>	<b>447</b>