

# **2016 IEEE 16th International Conference on Data Mining Workshops (ICDMW 2016)**

**Barcelona, Spain  
12-15 December 2016**

**Pages 1-670**



**IEEE Catalog Number: CFP1656B-POD  
ISBN: 978-1-5090-5911-9**

**Copyright © 2016 by the Institute of Electrical and Electronics Engineers, Inc  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP1656B-POD
ISBN (Print-On-Demand):	978-1-5090-5911-9
ISBN (Online):	978-1-5090-5910-2
ISSN:	2375-9232

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2016 IEEE 16th International Conference on Data Mining Workshops

## ICDMW 2016

### Table of Contents

Message from the Conference Chairs .....	xix
Message from the Workshop Co-Chairs .....	xxi
Organizing Committee .....	xxiii

---

#### **CLOUDBMINE + DMIoT**

##### **CLOUDBMINE — Data Mining Systems and their Applications on the Cloud**

Database Integrated Analytics Using R: Initial Experiences with SQL-Server + R .....	1
<i>Josep Ll. Berral and Nicolas Poggi</i>	
Parallelized Frequent Item Set Mining Using a Tall and Skinny Matrix .....	8
<i>D. Pooja Janakiram</i>	
A Probabilistic View of Neighborhood-Based Recommendation Methods .....	14
<i>Jun Wang and Qiang Tang</i>	
Discovering Multi-type Correlated Events with Time Series for Exception Detection of Complex Systems .....	21
<i>Peng Xun, Pei-Dong Zhu, Cun-Lu Li, and Hao-Yang Zhu</i>	

##### **DMIoT — Data Mining for Internet of Things**

Detecting Performance Degradation of Software-Intensive Systems in the Presence of Trends and Long-Range Dependence .....	29
<i>Alexey Artemov and Evgeny Burnaev</i>	
Scalable Online-Offline Stream Clustering in Apache Spark .....	37
<i>Omar Backhoff and Eirini Ntoutsi</i>	
Distributed Mining and Modeling of Dynamic Lead-Lag Relations in Evolving Entities .....	45
<i>Tian Guo, Jean-Paul Calbimonte, and Karl Aberer</i>	

Event Detection for Urban Dynamic Data Streams .....	53
<i>Septimiu Nechifor, Ioana Stefan, Marten Fischer, and Dan Puiu</i>	

## **DaMNet — Data Mining in Networks**

Segmenting Sequences of Node-Labeled Graphs .....	61
<i>Sorour E. Amiri, Liangzhe Chen, and B. Aditya Prakash</i>	
Inference of Partial Canonical Correlation Networks with Application to Stock Market Portfolio Selection .....	69
<i>Gregory Breard and Natallia Katenka</i>	
Overlapping Community Detection by Local Decentralised Vertex-Centred Process .....	77
<i>Maël Canu, Marie-Jeanne Lesot, and Adrien Revault D’Allonnes</i>	
Query-Based Evolutionary Graph Cuboid Outlier Detection .....	85
<i>Ayushi Dalmia, Manish Gupta, and Vasudeva Varma</i>	
Vertex Centric Asynchronous Belief Propagation Algorithm for Large-Scale Graphs .....	93
<i>Gabriel P. Gimenes, Hugo Gualdron, and Jose F. Rodrigues-Jr</i>	
Text Network Exploration via Heterogeneous Web of Topics .....	99
<i>Junxian He, Ying Huang, Changfeng Liu, Jiaming Shen, Yuting Jia, and Xinbing Wang</i>	
Classification of Normal and Pathological Brain Networks Based on Similarity in Graph Partitions .....	107
<i>Anvar Kurmukov, Yulia Dodonova, and Leonid Zhukov</i>	
Finding Heaviest k-Subgraphs and Events in Social Media .....	113
<i>Matthaios Letsios, Oana Denisa Balalau, Maximilien Danisch, Emmanuel Orsini, and Mauro Sozio</i>	
Knowledge Graph Constraints for Multi-label Graph Classification .....	121
<i>Martin Ringsquandl, Steffen Lamparter, Ingo Thon, Raffaello Lepratti, and Peer Kröger</i>	
Predicting User Roles in Social Networks Using Transfer Learning with Feature Transformation .....	128
<i>Jun Sun, Jérôme Kunegis, and Steffen Staab</i>	

## **DAPS — Data Mining for the Analysis of Performance and Success**

From Training to Match Performance: A Predictive and Explanatory Study on Novel Tracking Data .....	136
<i>Javier Fernández, Daniel Medina, Antonio Gómez, Marta Arias, and Ricard Gavaldá</i>	
Competition-Wide Evaluation of Individual and Team Movements in Soccer .....	144
<i>László Gyarmati and Mohamed Hefeeda</i>	
Football Market Strategies: Think Locally, Trade Globally .....	152
<i>Giulio Rossetti and Vincenzo Caproni</i>	

Characterization of In-season Elite Football Trainings by GPS Features: The Identity Card of a Short-Term Football Training Cycle .....	160
<i>Alessio Rossi, Enrico Perri, Athos Trecroci, Marco Savino, Giampietro Alberti, and Marcello Fedon Iaia</i>	
Towards Data-Driven Football Player Assessment .....	167
<i>Rade Stanojevic and László Gyarmati</i>	
Stick Must Fall: Using Machine Learning to Predict Human Error in Virtual Balancing Task .....	173
<i>Irina Zgonnikova, Arkady Zgonnikov, and Shigeru Kanemoto</i>	

## **DINA — Data Integration and Applications**

Towards Information Profiling: Data Lake Content Metadata Management .....	178
<i>Ayman Alserafi, Alberto Abelló, Oscar Romero, and Toon Calders</i>	
Historical Data Integration a Study of WWI Canadian Soldiers .....	186
<i>Luiza Antonie, Harshavardhan Gadgil, Gary Grewal, and Kris Inwood</i>	
Holistic Entity Clustering for Linked Data .....	194
<i>Markus Nentwig, Anika Groß, and Erhard Rahm</i>	
Cluster-Based Sorted Neighborhood for Efficient Duplicate Detection .....	202
<i>Ahmad Samiei and Felix Naumann</i>	
Integrated Analysis of Research Publications and Patents for Strategic Decision Making .....	210
<i>Nidhi Saraswat, Lipika Dey, Ishan Verma, and Hemant Gupta</i>	
Randomized Response and Balanced Bloom Filters for Privacy Preserving Record Linkage .....	218
<i>Rainer Schnell and Christian Borgs</i>	
A Probabilistic Address Parser Using Conditional Random Fields and Stochastic Regular Grammar .....	225
<i>Minlue Wang, Valeriia Haberland, Amos Yeo, Andrew Martin, John Howroyd, and J. Mark Bishop</i>	

## **DMBIH — Data Mining in Biomedical Informatics and Healthcare**

Construction of a Semi-Naive Model to Predict Early Readmission of COPD Patients by Using Quality Care Information .....	233
<i>Pablo Bermejo, José A. Gámez, José M. Puerta, Marco A. Esquivias, and Pedro J. Tárrega</i>	
Medical Image Denoising Using Convolutional Denoising Autoencoders .....	241
<i>Lovedeep Gondara</i>	

Machine Learning for Modeling the Biomechanical Behavior of Human Soft Tissue .....	247
<i>José D. Martín-Guerrero, María J. Rupérez-Moreno, Francisco Martínez-Martínez, Delia Lorente-Garrido, Antonio J. Serrano-López, Carlos Monserrat, Sandra Martínez-Sanchis, and Marcelino Martínez-Sober</i>	
Applying Conditional Independence Maps to Improve Sepsis Prognosis .....	254
<i>Carles Morales, Vicent Ribas, and Alfredo Vellido</i>	
Ligand-Based Virtual Screening with Co-regularised Support Vector Regression .....	261
<i>Katrin Ullrich, Michael Kamp, Thomas Gärtner, Martin Vogt, and Stefan Wrobel</i>	
<b>DMCS — Data Mining for Cyber Security</b>	
Uncertainty Aware Clustering for Behaviour in Enterprise Networks .....	269
<i>Maha Bakoben, Niall Adams, and Anthony Bellotti</i>	
One-Class SVM with Privileged Information and Its Application to Malware Detection .....	273
<i>Evgeny Burnaev and Dmitry Smolyakov</i>	
Adaptive Threshold Selection for Trust-Based Detection Systems .....	281
<i>Younghun Chae, Natallia Katenka, and Lisa Dipippo</i>	
The Time-Varying Dependency Patterns of NetFlow Statistics .....	288
<i>Alexander Gibberd, Marina Evangelou, and James D. B. Nelson</i>	
Learning a Secure Classifier against Evasion Attack .....	295
<i>Zeinab Khorshidpour, Sattar Hashemi, and Ali Hamzeh</i>	
Detection of Cyber-Physical Faults and Intrusions from Physical Correlations .....	303
<i>Andrey Y. Lokhov, Nathan Lemons, Thomas C. McAndrew, Aric Hagberg, and Scott Backhaus</i>	
Correlation-Based Streaming Anomaly Detection in Cyber-Security .....	311
<i>Jordan Noble and Niall M. Adams</i>	
Smart Phone User Behaviour Characterization Based on Autoencoders and Self Organizing Maps .....	319
<i>Deepthi Rajashekar, A. Nur Zincir-Heywood, and Malcolm I. Heywood</i>	
EdgeCentric: Anomaly Detection in Edge-Attributed Networks .....	327
<i>Neil Shah, Alex Beutel, Bryan Hooi, Leman Akoglu, Stephan Gunnemann, Disha Makhija, Mohit Kumar, and Christos Faloutsos</i>	
Authenticating Web User’s Identity through Browsing Sequences Modeling .....	335
<i>Peihai Zhao, Chungang Yan, and Changjun Jiang</i>	

## **DMED I — Data Mining in Emerging Domains I**

### **DWA — Data Wrangling Automation**

Using Machine Learning to Accelerate Data Wrangling .....	343
<i>Shilpi Ahuja, Mary Roth, Rashmi Gangadharaiah, Peter Schwarz, and Rafael Bastidas</i>	
Mining the Dark Web: Drugs and Fake Ids .....	350
<i>Andres Baravalle, Mauro Sanchez Lopez, and Sin Wee Lee</i>	
Toward Representation Independent Analytics over Structured Data .....	357
<i>Yodsawalai Chodpathumwan, Jose Picado, Arash Termehchy, Alan Fern, and Yizhou Sun</i>	

### **MDDM — Maritime Domain Data Mining**

Mining Vessel Tracking Data for Maritime Domain Applications .....	361
<i>Alfredo Alessandrini, Marlene Alvarez, Harm Greidanus, Vincenzo Gammieri, Virginia Fernandez Arguedas, Fabio Mazzarella, Carlos Santamaria, Mattia Stasolla, Dario Tarchi, and Michele Vespe</i>	
On the Interest of Data Mining for an Integrity Assessment of AIS Messages .....	368
<i>Clément Iphar, Aldo Napoli, and Cyril Ray</i>	
Scalable and Distributed Sea Port Operational Areas Estimation from AIS Data .....	374
<i>Leonardo M. Millefiori, Dimitrios Zissis, Luca Cazzanti, and Gianfranco Arcieri</i>	

## **DMED II — Data Mining in Emerging Domains II**

### **DaMEMO — Data Mining for Energy Modelling and Optimization**

Application of Fuzzy C-Means for Proactive Clustering of Electrical Power Systems .....	382
<i>M. Abdallatif, S. Schramm, and J. Götze</i>	
Online Outlier Detection of Energy Data Streams Using Incremental and Kernel PCA Algorithms .....	390
<i>Jeremiah D. Deng</i>	
Adaptive Time Series Forecasting of Energy Consumption Using Optimized Cluster Analysis .....	398
<i>Peter Laurinec, Marek Lóderer, Petra Vrablecová, Mária Lucká, Viera Rozinajová, and Anna Bou Ezzeddine</i>	
Structural Combination of Neural Network Models .....	406
<i>Juan Rendon and Lilian M. de Menezes</i>	
Incremental Time Series Prediction Using Error-Driven Informed Adaptation .....	414
<i>Petra Vrablecová, Viera Rozinajová, and Anna Bou Ezzeddine</i>	

## **DMiP — Data Mining in Politics**

Analysing Political Opinions Using Redescription Mining .....	422
<i>Esther Galbrun and Pauli Miettinen</i>	
Leave or Remain? Deciphering Brexit Deliberations on Twitter .....	428
<i>Apalak Khatua and Aparup Khatua</i>	
Change-Point Analysis of the Public Mood in UK Twitter during the Brexit Referendum .....	434
<i>Thomas Lansdall-Welfare, Fabon Dzogang, and Nello Cristianini</i>	
Structural Patterns in the Rise of Germany’s New Right on Facebook .....	440
<i>Sebastian Schelter, Felix Biessmann, Malisa Zobel, and Nedelina Teneva</i>	

## **DMHAA — Data Mining in Human Activity Analysis**

Weakly Supervised Hand Pose Recovery with Domain Adaptation by Low-Rank Alignment .....	446
<i>Chaoqun Hong, Jun Yu, Rongsheng Xie, and Dapeng Tao</i>	
Link Prediction in the Twitter Mention Network: Impacts of Local Structure and Similarity of Interest .....	454
<i>Hadrien Hours, Eric Fleury, and Márton Karsai</i>	
Gender Classification by Deep Learning on Millions of Weakly Labelled Images .....	462
<i>Sen Jia, Thomas Lansdall-Welfare, and Nello Cristianini</i>	
Real-Time Top-View People Counting Based on a Kinect and NVIDIA Jetson TK1 Integrated Platform .....	468
<i>Guangqin Li, Peng Ren, Xinrong Lyu, and He Zhang</i>	
Online Semi-Supervised Multi-task Distance Metric Learning .....	474
<i>Ya Li and Dacheng Tao</i>	
Local Structure Preserving Using Manifold Regularization and Pairwise Constraints for Action Recognition .....	480
<i>Xueqi Ma, Zhengyang Cao, and Weifeng Liu</i>	
Stereotypical Motor Movement Detection in Dynamic Feature Space .....	487
<i>Nastaran Mohammadian Rad, Seyed Mostafa Kia, Calogero Zarbo, Giuseppe Jurman, Paola Venuti, and Cesare Furlanello</i>	
Robust Automated Human Activity Recognition and Its Application to Sleep Research .....	495
<i>Aarti Sathyanarayana, Ferda Ofli, Luis Fernandez-Luque, Jaideep Srivastava, Ahmed Elmagarmid, Teresa Arora, and Shahrads Taheri</i>	
Sequence-to-Sequence Model with Attention for Time Series Classification .....	503
<i>Yujin Tang, Jianfeng Xu, Kazunori Matsumoto, and Chihiro Ono</i>	

## **DMS — Data Mining for Service**

Risk-Aware Dynamic Reserve Prices of Programmatic Guarantee in Display Advertising .....	511
<i>Bowei Chen</i>	
A Novel Method for Assessing Event Impacts on Event-Driven Time Series .....	519
<i>Lianhua Chi, Saket Sathe, Bo Han, and Yun Wang</i>	
Temporal Data Mining on the Stay Time of Outpatients and Treatment Processes .....	527
<i>Shoji Hirano</i>	
A Deep Learning Approach for the Prediction of Retail Store Sales .....	531
<i>Yuta Kaneko and Katsutoshi Yada</i>	
Website Classification Using Latent Dirichlet Allocation and Its Application for Internet Advertising .....	538
<i>Sotaro Katsumata, Eiji Motohashi, Akihiro Nishimoto, and Eiji Toyosawa</i>	
Personal Identification with Face and Voice Features Extracted through Kinect Sensor .....	545
<i>Eisuke Kita, Yi Zuo, Fumiya Saito, and Xuanang Feng</i>	
Data Mining Based Product Marketing Technique for Banking Products .....	552
<i>Merve Mitik, Ozan Korkmaz, Pinar Karagoz, Ismail Hakki Toroslu, and Ferhat Yucel</i>	
Interactive Independent Topic Analysis for Service .....	560
<i>Takahiro Nishigaki, Katsumi Nitta, and Takashi Onoda</i>	
Activity Detection from Email Meta-Data Clustering .....	568
<i>Mayur Patidar, Shaurya Rohatgi, Ashish Chaudhary, Mahesh P. Singh, Puneet Agarwal, and Gautam Shroff</i>	
Feature Selection in Environments with Limited Voluntary Information Sharing .....	576
<i>Nicholay Topin, Karan K. Budhraj, and Tim Oates</i>	
Domain Driven Forecasting: Applying Theory Into Practice .....	584
<i>Praveen Venkateswaran, Vikrant Shimpi, Maitreya Natu, and Vaishali Sadaphal</i>	
Multiscale Analysis of Supply Network at Central Region in Japan .....	592
<i>Yi Zuo and Yuya Kajikawa</i>	

## **DSBDA — Data Science and Big Data Analytics**

Visual Context Learning with Big Data Analytics .....	600
<i>Mayanka Chandrashekar and Yugyung Lee</i>	
Finding Large Matchings in Semi-Streaming .....	608
<i>Hossein Esfandiari, MohammadTaghi Hajiaghayi, and Morteza Monemizadeh</i>	
Effective and Unsupervised Fractal-Based Feature Selection for Very Large Datasets: Removing Linear and Non-linear Attribute Correlations .....	615
<i>Antonio C. Fraideinberze, José F. Rodrigues Jr., and Robson L. F. Cordeiro</i>	

Tovel: Distributed Graph Clustering for Word Sense Disambiguation .....	623
<i>Alessio Guerrieri, Fatemeh Rahimian, Sarunas Girdzijauskas, and Alberto Montresor</i>	
Will I Get in? Modeling the Graduate Admission Process for American Universities .....	631
<i>Narender Gupta, Aman Sawhney, and Dan Roth</i>	
Selecting the Top-k Discriminative Features Using Principal Component Analysis .....	639
<i>Aminata Kane and Nematollaah Shiri</i>	
Score Look-Alike Audiences .....	647
<i>Qiang Ma, Eeshan Wagh, Jiayi Wen, Zhen Xia, Robert Ormandi, and Datong Chen</i>	
Designing Sketches for Similarity Filtering .....	655
<i>Vladimir Mic, David Novak, and Pavel Zezula</i>	
Tracking Language Mobility in the Twitter Landscape .....	663
<i>Izabela Moise, Edward Gaere, Ruben Merz, Stefan Koch, and Evangelos Pournaras</i>	
Relative Label Encoding for the Prediction of Airline Passenger Nationality .....	671
<i>Alejandro Mottini and Rodrigo Acuna-Agost</i>	
WEFEST: Word Embedding Feature Extension for Short Text Classification .....	677
<i>Lei Sang, Fei Xie, Xiaojian Liu, and Xindong Wu</i>	
Knowledge Representation Learning via Dynamic Relation Spaces .....	684
<i>Zhen Tan, Xiang Zhao, Yang Fang, Weidong Xiao, and Jiuyang Tang</i>	
Steady Patterns .....	692
<i>Willy Ugarte, Alexandre Termier, and Miguel Santana</i>	
Mining Effective Subsequences with Application in Marketing Attribution .....	700
<i>Zi Yin, Ying Li, Pietro Mazzoleni, and Yuanyuan Shen</i>	
<b>HDM — High Dimensional Data Mining</b>	
Random Projection Clustering on Streaming Data .....	708
<i>Lee A. Carraher, Philip A. Wilsey, Anindya Moitra, and Sayantan Dey</i>	
An Empirical Analysis of Hubness in Unsupervised Distance-Based Outlier Detection .....	716
<i>Arthur Flexer</i>	
Topic Extraction Method from Millions of Tweets Based on Fast Feature Selection Technique CWC .....	724
<i>Takako Hashimoto, Dave Shepard, Tetsuji Kuboyama, and Kilho Shin</i>	
Regression on High-Dimensional Inputs .....	732
<i>Alexander Kuleshov and Alexander Bernstein</i>	
Clustering Based on MultiView Diffusion Maps .....	740
<i>Ofir Lindenbaum, Arie Yeredor, and Amir Averbuch</i>	
Aggregating Tree for Searching in Billion Scale High Dimensional Data .....	748
<i>Shicong Liu, Junru Shao, and Hongtao Lu</i>	

Semi-Supervised Similarity Preserving Co-Selection .....	756
<i>Raywat Makkhongkaew and Khalid Benabdeslem</i>	
Robust Local Scaling Using Conditional Quantiles of Graph Similarities .....	762
<i>Jayaraman J. Thiagarajan, Prasanna Sattigeri, Karthikeyan Natesan Ramamurthy, and Bhavya Kailkhura</i>	
Modelling Sentence Generation from Sum of Word Embedding Vectors as a Mixed Integer Programming Problem .....	770
<i>Lyndon White, Roberto Togneri, Wei Liu, and Mohammed Bennamoun</i>	

## **MoDAT — Data Market for Co-Evolution of Sciences and Business**

Method for Extraction of Purchase Behavior and Product Character Using Dynamic Topic Model .....	778
<i>Mamoru Emoto</i>	
Inferring Variable Labels Considering Co-occurrence of Variable Labels in Data Jackets .....	783
<i>Teruaki Hayashi</i>	
The Prominent Role of Probe Data and Big Data in Modern Technology .....	788
<i>Hideki Isetani</i>	
ID-Link, an Enabler for Medical Data Marketplace .....	792
<i>Ryuji Ito</i>	
Predicting the Outcome of Startups: Less Failure, More Success .....	798
<i>Amar Krishna, Ankit Agrawal, and Alok Choudhary</i>	
Aware Environment for Workshop with Game Storming .....	806
<i>Noriyuki Kushiro, Tatsuya Ehira, and Rei Kaihara</i>	
BRPS: A Big Data Placement Strategy for Data Intensive Applications .....	813
<i>Lihui Liu, Junping Song, Haibo Wang, and Pin Lv</i>	
Data Exchange Platform to Fight Insurance Fraud on Blockchain .....	821
<i>Indranil Nath</i>	
Visualization Method Based on Contour Map .....	826
<i>Rui Yang and Yukio Ohsawa</i>	

## **OEDM — Optimization Based Techniques for Emerging Data Mining**

MoCham: Robust Hierarchical Clustering Based on Multi-objective Optimization .....	831
<i>Tomas Barton, Tomas Bruna, and Pavel Kordik</i>	
Structural Nonparallel Support Vector Machine Based on LSH for Large-Scale Prediction .....	839
<i>Dandan Chen</i>	
Laplacian SVM for Learning from Label Proportions .....	847
<i>Limeng Cui, Zhensong Chen, Fan Meng, and Yong Shi</i>	

Incorporate Hashing with Multi-view Learning .....	853
<i>Jingjing Tang and Dewei Li</i>	

## **PDDM — Privacy and Discrimination in Data Mining**

Model-Based Approaches for Independence-Enhanced Recommendation .....	860
<i>Toshihiro Kamishima, Shotaro Akaho, Hideki Asoh, and Issei Sato</i>	
Classification Rule Mining Supported by Ontology for Discrimination Discovery .....	868
<i>Binh Thanh Luong, Salvatore Ruggieri, and Franco Turini</i>	
Faster Univariate Microaggregation for Power Law Distributions: k-Degree-Anonymity for Big Graphs .....	876
<i>Julian Salas</i>	
Scalable Privacy-Preserving Linking of Multiple Databases Using Counting Bloom Filters .....	882
<i>Dinusha Vatsalan, Peter Christen, and Erhard Rahm</i>	

## **SENTIRE — Sentiment Elicitation from Natural Text for Information Retrieval and Extraction**

Research on Sentiment Analysis: The First Decade .....	890
<i>Oskar Ahlgren</i>	
Mining the Opinionated Web: Classification and Detection of Aspect Contexts for Aspect Based Sentiment Analysis .....	900
<i>Oscar Araque, Ganggao Zhu, Manuel García-Amado, and Carlos A. Iglesias</i>	
What Drives Consumer Choices? Mining Aspects and Opinions on Large Scale Review Data Using Distributed Representation of Words .....	908
<i>Kasturi Bhattacharjee and Linda Petzold</i>	
Bayesian Deep Convolution Belief Networks for Subjectivity Detection .....	916
<i>Iti Chaturvedi, Erik Cambria, Soujanya Poria, and Rajiv Bajpai</i>	
Sentiment Lexica from Paired Comparisons .....	924
<i>Christoph Dalitz and Katrin E. Bednarek</i>	
Seasonal Fluctuations in Collective Mood Revealed by Wikipedia Searches and Twitter Posts .....	931
<i>Fabon Dzogang, Thomas Lansdall-Welfare, and Nello Cristianini</i>	
The Truth and Nothing But the Truth: Multimodal Analysis for Deception Detection .....	938
<i>Mimansa Jaiswal, Sairam Tabibu, and Rajiv Bajpai</i>	
Scalable and Real-Time Sentiment Analysis of Twitter Data .....	944
<i>Maria Karanasou, Anneta Ampla, Christos Doulkeridis, and Maria Halkidi</i>	
Multi-sentiment Modeling with Scalable Systematic Labeled Data Generation via Word2Vec Clustering .....	952
<i>Dhruv Mayank, Kanchana Padmanabhan, and Koushik Pal</i>	

SmartVideoRanking: Video Search by Mining Emotions from Time-Synchronized Comments .....	960
<i>Kosetsu Tsukuda, Hamasaki Masahiro, and Masataka Goto</i>	
Modeling Satire in English Text for Automatic Detection .....	970
<i>Aishwarya N. Reganti, Tushar Maheshwari, Upendra Kumar, Amitava Das, and Rajiv Bajpai</i>	
Lexicon Knowledge Extraction with Sentiment Polarity Computation .....	978
<i>Zhaoxia Wang, Victor Joo Chuan Tong, Pingcheng Ruan, and Fang Li</i>	

## **SERecSys — Semantics-Enabled Recommender Systems**

Exploiting a Determinant-Based Metric to Evaluate a Word-Embeddings Matrix of Items .....	984
<i>Ludovico Boratto, Salvatore Carta, Gianni Fenu, and Roberto Saia</i>	
Semantic Enabled Recommender System for Micro-Blog Users .....	992
<i>Stefano Faralli, Giorgia Di Tommaso, and Paola Velardi</i>	
SemStim: Exploiting Knowledge Graphs for Cross-Domain Recommendation .....	999
<i>Benjamin Heitmann and Conor Hayes</i>	
Context-Specific Recommendation System for Predicting Similar PubMed Articles .....	1007
<i>Shahin Mohammadi, Sudhir Kylasa, Giorgos Kollias, and Ananth Grama</i>	
SeBPR: Semantics Enhanced Bayesian Personalized Ranking with Comparable Item Pairs .....	1015
<i>Penghua Yu and Lanfen Lin</i>	

## **SOMERIS — Social Media and Risk**

Learning from User Workflows for the Characterization and Prediction of Software Crashes .....	1023
<i>Chloé Adam, Antoine Aliotti, and Paul-Henry Cournède</i>	
Microblog Sentiment Topic Model .....	1031
<i>Aman Ahuja, Wei Wei, and Kathleen M. Carley</i>	
Graph-Based Term Weighting Scheme for Topic Modeling .....	1039
<i>Giannis Bekoulis and François Rousseau</i>	
Ensemble of Heterogeneous Classifiers for Improving Automated Tweet Classification .....	1045
<i>Renhao Cui, Gagan Agrawal, Rajiv Ramnath, and Vinh Khuc</i>	
Identifying Warning Behaviors of Violent Lone Offenders in Written Communication .....	1053
<i>Lisa Kaati, Amendra Shrestha, and Tony Sardella</i>	
Investors Attention and the Effects on Stock Market: An Empirical Study Based on Stock Forum .....	1061
<i>Wen Long, Lijing Guan, and Lingxiao Cui</i>	

Time-Based Ensembles for Prediction of Rare Events in News Stream .....	1066
<i>Nuno Moniz, Luis Torgo, and Magdalini Eirinaki</i>	
Fraud Detection in Voice-Based Identity Authentication Applications and Services .....	1074
<i>Saeid Safavi, Hock Gan, Iosif Mporas, and Reza Sotudeh</i>	
<b>SSTDM — Spatial and Spatiotemporal Data Mining</b>	
Discovering Spatial Regions of High Correlation .....	1082
<i>Prerna Agarwal, Richa Verma, and Venkata M. V. Gunturi</i>	
A Graph-Based Approach to Spatiotemporal Event Sequence Mining .....	1090
<i>Berkay Aydin and Rafal A. Angryk</i>	
Hierarchical Aggregation Approach for Distributed Clustering of Spatial Datasets .....	1098
<i>Malika Bendechache, Nhien-An Le-Khac, and M-Tahar Kechadi</i>	
Markov Switching Copula Models for Longitudinal Data .....	1104
<i>Alfredo Cuesta-Infante and Kalyan Veeramachaneni</i>	
Location Recommendations for New Businesses Using Check-in Data .....	1110
<i>Bahaeddin Eravci, Neslihan Bulut, Cagri Etemoglu, and Hakan Ferhatosmanoğlu</i>	
Generating Time-Varying Road Network Data Using Sparse Trajectories .....	1118
<i>Elif Eser, Furkan Kocayusufoğlu, Bahaeddin Eravci, Hakan Ferhatosmanoğlu, and Josep L. Larriba-Pey</i>	
A Pattern Growth-Based Approach for Mining Spatiotemporal Co-occurrence Patterns .....	1125
<i>Shah Muhammad Hamdi, Berkay Aydin, and Rafal A. Angryk</i>	
Correlating Social Interconnections of Users with Spatio-Temporal Check-Ins Behavior .....	1133
<i>Sonia Khetarpaul, S. K. Gupta, and L. Venkata Subramaniam</i>	
Flexible Similarity Search for Enriched Trajectories .....	1139
<i>Hideaki Ohashi, Toshiyuki Shimizu, and Masatoshi Yoshikawa</i>	
TrendTracker: Modelling the Motion of Trends in Space and Time .....	1145
<i>Klaus Arthur Schmid, Christian Frey, Fengchao Peng, Michael Weiler, Andreas Zufle, Lei Chen, and Matthias Renz</i>	
A Genetic Algorithm to Discover Flexible Motifs with Support .....	1153
<i>Joan Serrà, Aleksandar Matic, Josep Lluís Arcos, and Alexandros Karatzoglou</i>	
Vehicle Classification from Low Frequency GPS Data .....	1159
<i>Matteo Simoncini, Francesco Sambo, Leonardo Taccari, Luca Bravi, Samuele Salti, and Alessandro Lori</i>	
Hierarchical Temporal Memory Method for Time-Series-Based Anomaly Detection .....	1167
<i>Jia Wu, Weiru Zeng, Zhe Chen, and Xue-Fei Tang</i>	
Spatio-Temporal Site Recommendation .....	1173
<i>Guolei Yang and Andreas Züfle</i>	

## PhD Forum

Sacrificing Overall Classification Quality to Improve Classification Accuracy of Well-Sought Classes .....	1179
<i>Kevin M. Amaral, Ping Chen, Wei Ding, and Rajani Sadasivam</i>	
Towards Visualizing Hidden Structures .....	1183
<i>Remy Dautriche, Alexandre Termier, Renaud Blanch, and Miguel Santana</i>	
Regression Techniques for Modelling Conception in Seasonally Calving Dairy Cows .....	1191
<i>Caroline Fenlon, Luke O’Grady, Michael Doherty, Stephen Butler, Laurence Shalloo, and John Dunnion</i>	
A Semi-Supervised Ensemble Approach for Multi-label Learning .....	1197
<i>Ouadie Gharroudi, Haytham Elghazel, and Alexandre Aussem</i>	
A Novel Bayesian Ensemble Pruning Method .....	1205
<i>Zhengshen Jiang, Hongzhi Liu, Bin Fu, and Zhonghai Wu</i>	
Improving the Prediction Cost of Drift Handling Algorithms by Abstaining .....	1213
<i>Pierre-Xavier Loeffel, Vincent Lemaire, Christophe Marsala, and Marcin Detyniecki</i>	
Infer Mobility Patterns and Social Dynamics for Modelling Human Behaviour .....	1223
<i>Luca Luceri</i>	
Subspace Clustering Ensembles through Tensor Decomposition .....	1225
<i>Dominik Mautz, Christian Böhm, and Claudia Plant</i>	
Applying Deep Learning to Stereotypical Motor Movement Detection in Autism Spectrum Disorders .....	1235
<i>Nastaran Mohammadian Rad and Cesare Furlanello</i>	
Similarity Tree Pruning: A Novel Dynamic Ensemble Selection Approach .....	1243
<i>Anil Narassiguin, Haytham Elghazel, and Alex Aussem</i>	
Clustering with the Levy Walk: “Hunting” for Clusters .....	1251
<i>Benjamin Schelling and Claudia Plant</i>	
Centrality-Based Approach for Supervised Term Weighting .....	1261
<i>Niloofar Shanavas, Hui Wang, Zhiwei Lin, and Glenn Hawe</i>	
A Novel Pre-Classification Based kNN Algorithm .....	1269
<i>Huahua Xie, Dong Liang, Zhaojing Zhang, Hao Jin, Chen Lu, and Yi Lin</i>	

## Demos

A Formation Energy Predictor for Crystalline Materials Using Ensemble Data Mining .....	1276
<i>Ankit Agrawal, Bryce Meredig, Chris Wolverton, and Alok Choudhary</i>	
Five Year Life Expectancy Calculator for Older Adults .....	1280
<i>Ankit Agrawal, Jason Mathias, David Baker, and Alok Choudhary</i>	

Financial Data Analysis with PGMs Using AMIDST .....	1284
<i>Rafael Cabañas, Ana M. Martínez, Andrés R. Masegosa, Darío Ramos-López, Antonio Samerón, Thomas D. Nielsen, Helge Langseth, and Anders L. Madsen</i>	
TENET: A Machine Learning-Based System for Target Characterization in Signaling Networks .....	1288
<i>Huey Eng Chua, Sourav S. Bhowmick, Lisa Tucker-Kellogg, and C. Forbes Dewey Jr.</i>	
PaTSI: Pattern Mining of Time Series of Satellite Images in Knime .....	1292
<i>Maxime Collin, Frédéric Flouvat, and Nazha Selmaoui-Folcher</i>	
airVLC: An Application for Visualizing Wind-Sensitive Interpolation of Urban Air Pollution Forecasts .....	1296
<i>Lidia Contreras-Ochando and Cèsar Ferri</i>	
Explode: An Extensible Platform for Differentially Private Data Analysis .....	1300
<i>Emir Esmerdag, Mehmet Emre Gursoy, Ali Inan, and Yucel Saygin</i>	
Cognito: Automated Feature Engineering for Supervised Learning .....	1304
<i>Udayan Khurana, Deepak Turaga, Horst Samulowitz, and Srinivasan Parthasarathy</i>	
Risk Mining: Company-Risk Identification from Unstructured Sources .....	1308
<i>Timothy Nugent and Jochen L. Leidner</i>	
MobInsight: Understanding Urban Mobility with Crowd-Powered Neighborhood Characterizations .....	1312
<i>Souneil Park, Marc Bourqui, and Enrique Frias-Martinez</i>	
Graph Mining for Complex Data Analytics .....	1316
<i>André Petermann, Martin Junghanns, Stephan Kemper, Kevin Gómez, Niklas Teichmann, and Erhard Rahm</i>	
FacetsViewer: A Tool for Multi-faceted Decomposition of Complex Networks .....	1320
<i>Boon-Siew Seah, Sourav S. Bhowmick, Huey Eng Chua, Mengxuan Chen, and C. Forbes Dewey Jr.</i>	
SpreadViz: Analytics and Visualization of Spreading Processes in Social Networks .....	1324
<i>Konstantinos Skianis, Maria-Evgenia G. Rossi, Fragkiskos D. Malliaros, and Michalis Vazirgiannis</i>	
DFA-G: A Unified Programming Model for Vertex-Centric Parallel Graph Processing .....	1328
<i>Bo Suo, Jing Su, Qun Chen, Zhanhuai Li, and Wei Pan</i>	
Informed Design Platform: Interpreting “Big Data” to Adaptive Place Designs .....	1332
<i>Linlin You and Bige Tunçer</i>	

## Author Index