

Publications Related to Contrast Mining and Applications

We are in the process of writing/editing a book on research results concerning various contrast pattern/models, their mining, and their application.

For that purpose and for the benefit of the data mining community, we have been collecting published papers (including PhD theses) on those topics. Below you will find the current list of such papers.

Clearly this list is not yet complete. If you know of publications missing in the current list, please email those entries (ideally in bibtex, including full author names) to guozhu.dong@gmail.com.

Thank you

Guozhu Dong

PhD Theses On Contrast Pattern Mining and Applications

There are more than 10 PhD dissertations (known to us) written on topics closely related to contrast/emerging pattern mining and their applications.

1. [142]: Jinyan Li. Mining Emerging Patterns to Construct Accurate and Efficient Classifiers. PhD Thesis, University of Melbourne, 2001.
2. [279]: Xiuzhen Zhang. Emerging Patterns: Efficient Constraint-Based Mining and the Aggregation Approach for Classification. PhD Thesis, University of Melbourne, 2001.
3. [77]: Hongjian Fan. Efficient Mining of Interesting Emerging Patterns and Their Effective Use in Classification. PhD Thesis, University of Melbourne, May 2004.
4. [2]: Hamad Alhammady. The Application of Emerging Patterns in Solving Classification Problems. PhD Thesis, University of Melbourne, 2005.
5. [181]: Shihong Mao. Comparative Microarray Data Mining. PhD Thesis, Wright State University, 2007.
6. [116]: Xiaonan Ji. Constraint Based Sequential Pattern Mining and its Applications. PhD Thesis, University of Melbourne, 2008.
7. [127] Young Bun Kim, Comprehensive Data Analysis for Biomarker Pattern Discovery Using DNA/Protein Microarrays, University of Texas at Arlington, 2008
8. [187]: Sébastien Nedjar. Cubes Emergents pour l'analyse des renversements de tendances dans les bases de données multidimensionnelles. PhD Thesis, Doctorat Aix-Marseille Université délivré par l'Université de la Méditerranée, 2009.
9. [232]: Pawel Terlecki. On the Relation between Jumping Emerging Patterns and Rough Set Theory with Application to Data Classification. PhD Thesis, Institute of Computer Science, Warsaw University of Technology, 2009.

* Dr Pawel Terlecki received the Prime Minister's Award for his PhD thesis. His thesis supervisor was Professor Krzysztof Walczak.

10. [52]: Hong Cheng. Towards Accurate and Efficient Classification: A Discriminative and Frequent Pattern-Based Approach, University of Illinois at Urbana-Champaign (UIUC), 2009.

Dr. Hong Cheng received the honor of finalist for 2009 ACM SIGKDD Doctoral Dissertation Award competition for her thesis. She was advised by Professor Jiawei Han.

11. [176]: Elsa Loekito, Mining Simple and Complex Patterns Efficiently Using Binary Decision Diagrams, University of Melbourne, 2009.
12. [102]: Dominique Gay, Constraint-based pattern mining for classification purpose, Universit de Nouvelle Caldonie INSA de Lyon, 2009.
13. [97]: Milton Garcia-Borroto. Searching Extended Emerging Patterns for Supervised Classification. PhD Thesis, Computer Science Department, National Institute for Astrophysics Optics and Electronics, Puebla, Mexico, 2010.

List of Papers on Contrast Pattern Mining and Applications

References

- [1] Tarek Abudawood and Peter A. Flach. Evaluation measures for multi-class subgroup discovery. In *ECML/PKDD*, pages 35–50, 2009.
- [2] Hamad Alhammady. *The Application of Emerging Patterns in Solving Classification Problems*. PhD Thesis, University of Melbourne, 2005.
- [3] Hamad Alhammady. Mining streaming emerging patterns from streaming data. In *IEEE/ACS International Conference on Computer Systems and Applications (AICCSA)*, pages 432–436, 2007.
- [4] Hamad Alhammady and Kotagiri Ramamohanarao. The application of emerging patterns for improving the quality of rare-class classification. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 207–211, 2004.
- [5] Hamad Alhammady and Kotagiri Ramamohanarao. Using emerging patterns and decision trees in rare-class classification. In *IEEE International Conference on Data Mining (ICDM)*, pages 315–318, 2004.
- [6] Hamad Alhammady and Kotagiri Ramamohanarao. Expanding the training data space using emerging patterns and genetic methods. In *SIAM International Conference on Data Mining (SDM)*, 2005.
- [7] Hamad Alhammady and Kotagiri Ramamohanarao. Mining emerging patterns and classification in data streams. In *IEEE / WIC / ACM International Conference on Web Intelligence*, pages 272–275, 2005.
- [8] Hamad Alhammady and Kotagiri Ramamohanarao. Using emerging patterns to construct weighted decision trees. *IEEE Trans. Knowl. Data Eng.*, 18(7):865–876, 2006.
- [9] Faris Alqadah and Raj Bhatnagar. Detecting significant distinguishing sets among bi-clusters. In *17th ACM Conference on Information and Knowledge Management (CIKM)*, pages 1455–1456, 2008.

- [10] Faris Alqadah and Raj Bhatnagar. Discovering substantial distinctions among incremental bi-clusters. In *SIAM International Conference on Data Mining (SDM)*, pages 197–208, 2009.
- [11] Mohd. Amir and Durga Toshniwal. Instance-based classification of streaming data using emerging patterns. In *International Conference on Information and Communication Technologies (ICT)*, pages 228–236, 2010.
- [12] Aijun An, Qian Wan, Jiashu Zhao, and Xiangji Huang. Diverging patterns: discovering significant frequency change dissimilarities in large databases. In *International Conference on Information and Knowledge Management (CIKM)*, pages 1473–1476, 2009.
- [13] Rajul Anand and Chandan K. Reddy. Constrained logistic regression for discriminative pattern mining. In *European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)*, 2011.
- [14] Piotr Andruszkiewicz. Lazy approach to privacy preserving classification with emerging patterns. In *19th International Symposium (ISMIS) Emerging Intelligent Technologies in Industry*, pages 253–268, 2011.
- [15] Annalisa Appice, Michelangelo Ceci, Carlo Malgieri, and Donato Malerba. Discovering relational emerging patterns. In *Artificial Intelligence and Human-Oriented Computing, 10th Congress of the Italian Association for Artificial Intelligence (AI*IA)*, pages 206–217, 2007.
- [16] Nima Asgharbeygi, David J. Stracuzzi, and Pat Langley. Relational temporal difference learning. In *International Conference on Machine Learning (ICML)*, pages 49–56, 2006.
- [17] Jens Auer and Jurgen Bajorath. Emerging chemical patterns: A new methodology for molecular classification and compound selection. *Journal of Chemical Information and Modeling*, 46(6):2502–2514, 2006.
- [18] Jens Auer and Jurgen Bajorath. Distinguishing between bioactive and modeled compound conformations through mining of emerging chemical patterns. *Journal of Chemical Information and Modeling*, 48(9):1747–1753, 2008.

- [19] Jens Auer and Jurgen Bajorath. Simulation of sequential screening experiments using emerging chemical patterns. *Medicinal Chemistry*, 4(1):80–90, 2008.
- [20] Paulo J. Azevedo. Rules for contrast sets. *Intell. Data Anal.*, 14(6):623–640, 2010.
- [21] James Bailey and Guozhu Dong. Contrast data mining: Methods and applications. Tutorial at the IEEE International Conference on Data Mining (ICDM), 2007.
- [22] James Bailey and Elsa Loekito. Efficient incremental mining of contrast patterns in changing data. *Inf. Process. Lett.*, 110(3):88–92, 2010.
- [23] James Bailey, Thomas Manoukian, and Kotagiri Ramamohanarao. Fast algorithms for mining emerging patterns. In *European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)*, pages 39–50, 2002.
- [24] James Bailey, Thomas Manoukian, and Kotagiri Ramamohanarao. Classification using constrained emerging patterns. In *International Conference on Web-Age Information Management (WAIM)*, pages 226–237, 2003.
- [25] James Bailey, Thomas Manoukian, and Kotagiri Ramamohanarao. A fast algorithm for computing hypergraph transversals and its application in mining emerging patterns. In *IEEE International Conference on Data Mining (ICDM)*, pages 485–488, 2003.
- [26] Elena Baralis and Silvia Chiusano. Essential classification rule sets. *ACM Trans. Database Syst.*, 29(4):635–674, 2004.
- [27] Stephen D. Bay and Michael J. Pazzani. Detecting change in categorical data: Mining contrast sets. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 302–306, 1999.
- [28] Stephen D. Bay and Michael J. Pazzani. Characterizing model errors and differences. In *International Conference on Machine Learning (ICML)*, pages 49–56, 2000.
- [29] Stephen D. Bay and Michael J. Pazzani. Detecting group differences: Mining contrast sets. *Data Min. Knowl. Discov.*, 5(3):213–246, 2001.

- [30] Stephen D. Bay, Daniel G. Shapiro, and Pat Langley. Revising engineering models: Combining computational discovery with knowledge. In *European Conference on Machine Learning (ECML)*, pages 10–22, 2002.
- [31] Ryan Bissell-Siders, Bertrand Cuissart, and Bruno Crémilleux. On the stimulation of patterns - definitions, calculation method and first usages. In *18th International Conference on Conceptual Structures (ICCS)*, pages 56–69, 2010.
- [32] Mirko Böttcher. Contrast and change mining. *Wiley Interdisc. Rev.: Data Mining and Knowledge Discovery*, 1(3):215–230, 2011.
- [33] Anne-Laure Boulesteix and Gerhard Tutz. Identification of interaction patterns and classification with applications to microarray data. *Computational Statistics & Data Analysis*, 50(3):783–802, 2006.
- [34] Anne-Laure Boulesteix, Gerhard Tutz, and Korbinian Strimmer. A CART-based approach to discover emerging patterns in microarray data. *Bioinformatics*, 19(18):2465–2472, 2003.
- [35] Bjorn Bringmann, Siegfried Nijssen, and Albrecht Zimmermann. Pattern-based classification: A unifying perspective. In *From Local Patterns to Global Models, an ECML/PKDD Workshop*, 2009.
- [36] Yandong Cai, Nick Cercone, and Jiawei Han. Attribute-oriented induction in relational databases. In *Knowledge Discovery in Databases*, pages 213–228. AAAI/MIT Press, 1991.
- [37] Longbing Cao, Chengqi Zhang, Yanchang Zhao, Philip S. Yu, and Graham Williams. DDDM2007: Domain driven data mining. *SIGKDD Explorations*, 9(2):84–86, 2007.
- [38] Michelangelo Ceci, Annalisa Appice, Costantina Caruso, and Donato Malerba. Discovering emerging patterns for anomaly detection in network connection data. In *17th International Symposium Foundations of Intelligent Systems (ISMIS)*, pages 179–188, 2008.
- [39] Michelangelo Ceci, Annalisa Appice, Corrado Loglisci, Costantina Caruso, Fabio Fumarola, and Donato Malerba. Novelty detection from evolving complex data streams with time windows. In *International Symposium on Foundations of Intelligent Systems (ISMIS)*, pages 563–572, 2009.

- [40] Michelangelo Ceci, Annalisa Appice, Lucrezia Macchia, and Donato Malerba. Relational classification based on emerging patterns. In *Sixteenth Italian Symposium on Advanced Database Systems (SEBD)*, pages 45–56, 2008.
- [41] Michelangelo Ceci, Annalisa Appice, and Donato Malerba. Discovering emerging patterns in spatial databases: A multi-relational approach. In *11th European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)*, pages 390–397, 2007.
- [42] Michelangelo Ceci, Annalisa Appice, and Donato Malerba. Emerging pattern based classification in relational data mining. In *19th International Conference on Database and Expert Systems Applications (DEXA)*, pages 283–296, 2008.
- [43] Mete Celik, Shashi Shekhar, James P. Rogers, and James A. Shine. Sustained emerging spatio-temporal co-occurrence pattern mining: A summary of results. In *IEEE International Conference on Tools with Artificial Intelligence (ICTAI)*, pages 106–115, 2006.
- [44] Loïc Cerf, Dominique Gay, Nazha Selmaoui, and Jean-François Boulicaut. A parameter-free associative classification method. In *10th International Conference on Data Warehousing and Knowledge Discovery (DaWaK)*, pages 293–304, 2008.
- [45] Jeffrey Chan, James Bailey, and Christopher Leckie. Discovering and summarising regions of correlated spatio-temporal change in evolving graphs. In *ICDM Workshops*, pages 361–365, 2006.
- [46] Sarah Chan, Ben Kao, Chi Lap Yip, and Michael Tang. Mining emerging substrings. In *International Symposium on Database Systems for Advanced Applications (DASFAA)*, 2003.
- [47] Wing-yan Sarah Chan. *Emerging substrings for sequence classification*. Master of Philosophy Thesis, University of Hong Kong, 2003.
- [48] Lijun Chen and Guozhu Dong. Masquerader detection using OCLEP: One class classification using length statistics of emerging patterns. In *International Workshop on Information Processing over Evolving Networks (WINPEN)*, 2006.

- [49] Lijun Chen and Guozhu Dong. Succinct and informative cluster descriptions for document repositories. In *7th International Conference on Web-Age Information Management (WAIM)*, pages 109–121, 2006.
- [50] Mu-Chen Chen, Ai-Lun Chiu, and Hsu-Hwa Chang. Mining changes in customer behavior in retail marketing. *Expert Syst. Appl.*, 28(4):773–781, 2005.
- [51] Xiaoyun Chen and Jinhua Chen. Emerging patterns and classification algorithms for DNA sequence. *Journal of Software*, 6(6):985–992, 2011.
- [52] Hong Cheng. *Towards Accurate and Efficient Classification: A Discriminative and Frequent Pattern-Based Approach*. PhD Thesis, University of Illinois at Urbana-Champaign (UIUC), 2009. Recipient of finalist for 2009 ACM SIGKDD Doctoral Dissertation Award Competition.
- [53] Hong Cheng, Xifeng Yan, Jiawei Han, and Chih-Wei Hsu. Discriminative frequent pattern analysis for effective classification. In *IEEE International Conference on Data Engineering*, pages 716–725, 2007.
- [54] Hong Cheng, Xifeng Yan, Jiawei Han, and Philip S. Yu. Direct discriminative pattern mining for effective classification. In *IEEE International Conference on Data Engineering*, pages 169–178, 2008.
- [55] Michael W. K. Cheng, Byron Choi, and William Kwok-Wai Cheung. Hiding emerging patterns with local recoding generalization. In *Advances in Knowledge Discovery and Data Mining (PAKDD)*, pages 158–170, 2010.
- [56] Chun-Jung Chu, Vincent S. Tseng, and Tyne Liang. Efficient mining of temporal emerging itemsets from data streams. *Expert Syst. Appl.*, 36(1):885–893, 2009.
- [57] Gautam Das and Heikki Mannila. Context-based similarity measures for categorical databases. In *European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)*, pages 201–210, 2000.
- [58] Gautam Das, Heikki Mannila, and Pirjo Ronkainen. Similarity of attributes by external probes. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 23–29, 1998.
- [59] Kang Deng and Osmar R. Zaiane. Contrasting sequence groups by emerging sequences. In *Discovery Science*, pages 377–384, 2009.

- [60] Kang Deng and Osmar R. Zaiane. An occurrence based approach to mine emerging sequences. In *International Conference on Data Warehousing and Knowledge Discovery*, pages 275–284, 2010.
- [61] Guiguang Ding, Jianmin Wang, and Kai Qin. A visual word weighting scheme based on emerging itemsets for video annotation. *Inf. Process. Lett.*, 110(16):692–696, 2010.
- [62] Wei Ding, Tomasz F. Stepinski, and Josue Salazar. Discovery of geospatial discriminating patterns from remote sensing datasets. In *SIAM International Conference on Data Mining (SDM)*, pages 425–436, 2009.
- [63] Andrzej Dominik, Zbigniew Walczak, and Jacek Wojciechowski. Classifying chemical compounds using contrast and common patterns. In *8th International Conference on Adaptive and Natural Computing Algorithms (ICANNGA)*, pages 772–781, 2007.
- [64] Guozhu Dong and James Bailey, editors. *Contrast Data Mining: Concepts, Algorithms, and Applications*. Data Mining and Knowledge Discovery Series. Chapman & Hall/CRC, To appear in 2012.
- [65] Guozhu Dong and Kaustubh Deshpande. Efficient mining of niches and set routines. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 234–246, 2001.
- [66] Guozhu Dong and Neil Fore. Discovering dynamic logical blog communities based on their distinct interest profiles. In *International Conference on Social Eco-Informatics (SOTICS)*, 2011.
- [67] Guozhu Dong, Jiawei Han, Joyce M. W. Lam, Jian Pei, Ke Wang, and Wei Zou. Mining constrained gradients in large databases. *IEEE Trans. Knowl. Data Eng.*, 16(8):922–938, 2004.
- [68] Guozhu Dong and Jinyan Li. Efficient mining of emerging patterns: Discovering trends and differences. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 43–52, 1999.
- [69] Guozhu Dong and Jinyan Li. Mining border descriptions of emerging patterns from dataset pairs. *Knowl. Inf. Syst.*, 8(2):178–202, 2005.

- [70] Guozhu Dong and Jinyan Li. Applications of emerging patterns for microarray gene expression data analysis. In *Encyclopedia of Database Systems*, page 107. 2009.
- [71] Guozhu Dong and Jinyan Li. Emerging pattern based classification. In *Encyclopedia of Database Systems*, page 985. 2009.
- [72] Guozhu Dong, Jinyan Li, Guimei Liu, and Limsoon Wong. *Mining Conditional Contrast Patterns. Chapter in Post-Mining of Association Rules: Techniques for Effective Knowledge Extraction*. Yanchang Zhao and Chengqi Zhang and Longbing Cao eds. IGI Global, 2009.
- [73] Guozhu Dong and Ting Sa. Analyzing and tracking weblog communities using discriminative collection representatives. In *Advances in Social Computing, Third International Conference on Social Computing, Behavioral Modeling, and Prediction, (SBP)*, pages 256–264, 2010.
- [74] Guozhu Dong, Xiuzhen Zhang, Limsoon Wong, and Jinyan Li. CAEP: Classification by aggregating emerging patterns. In *Discovery Science*, pages 30–42, 1999.
- [75] Lei Duan, Changjie Tang, Liang Tang, Tianqing Zhang, and Jie Zuo. Mining class contrast functions by gene expression programming. In *International Conference on Advanced Data Mining and Applications (ADMA)*, pages 116–127, 2009.
- [76] Lei Duan, Jie Zuo, Tianqing Zhang, Jing Peng, and Jie Gong. Mining contrast inequalities in numeric dataset. In *International Conference on Web-Age Information Management (WAIM)*, pages 194–205, 2010.
- [77] Hongjian Fan. *Efficient Mining of Interesting Emerging Patterns and Their Effective Use in Classification*. PhD Thesis, University of Melbourne, May 2004.
- [78] Hongjian Fan, Ming Fan, Kotagiri Ramamohanarao, and Mengxu Liu. Further improving emerging pattern based classifiers via bagging. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 91–96, 2006.
- [79] Hongjian Fan and Kotagiri Ramamohanarao. An efficient single-scan algorithm for mining essential jumping emerging patterns for classifica-

- tion. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 456–462, 2002.
- [80] Hongjian Fan and Kotagiri Ramamohanarao. A Bayesian approach to use emerging patterns for classification. In *Australasian Database Conference*, pages 39–48, 2003.
- [81] Hongjian Fan and Kotagiri Ramamohanarao. Efficiently mining interesting emerging patterns. In *International Conference on Web-Age Information Management (WAIM)*, pages 189–201, 2003.
- [82] Hongjian Fan and Kotagiri Ramamohanarao. Noise tolerant classification by chi emerging patterns. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 201–206, 2004.
- [83] Hongjian Fan and Kotagiri Ramamohanarao. A weighting scheme based on emerging patterns for weighted support vector machines. In *IEEE International Conference on Granular Computing*, pages 435–440, 2005.
- [84] Hongjian Fan and Kotagiri Ramamohanarao. Fast discovery and the generalization of strong jumping emerging patterns for building compact and accurate classifiers. *IEEE Trans. Knowl. Data Eng.*, 18(6):721–737, 2006.
- [85] Ming Fan and Yanxia Liu. Rare class classification based on essential emerging patterns. *Journal of Computer Applications (in Chinese)*, B12:152–154, 2005.
- [86] Wei Fan, Kun Zhang, Hong Cheng, Jing Gao, Xifeng Yan, Jiawei Han, Philip S. Yu, and Olivier Verscheure. Direct mining of discriminative and essential frequent patterns via model-based search tree. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 230–238, 2008.
- [87] Gang Fang, Gaurav Pandey, Wen Wang, Manish Gupta, Michael Steinbach, and Vipin Kumar. Mining low-support discriminative patterns from dense and high-dimensional data. Technical Report 09-011, University of Minnesota - Computer Science and Engineering, 2009.
- [88] Gang Fang, Wen Wang, Benjamin Oatley, Brian Van Ness, Michael Steinbach, and Vipin Kumar. Characterizing discriminative patterns. *Computing Research Repository*, abs/1102.4, 2011.

- [89] Neil Fore and Guozhu Dong. CPC: A contrast pattern based clustering algorithm requiring no distance function. In *Under Review*, 2011.
- [90] Neil Fore and Guozhu Dong. CPC: A contrast pattern based clustering algorithm requiring no distance function. Technical report, Department of Computer Science and Engineering, Wright State University, 2011.
- [91] Jerome H. Friedman and Nicholas I. Fisher. Bump hunting in high-dimensional data. *Statistics and Computing*, 9(2):123143, 1999.
- [92] Johannes Fürnkranz and Peter A. Flach. An analysis of rule evaluation metrics. In *International Conference on Machine Learning (ICML)*, pages 202–209, 2003.
- [93] Tomasz Gambin and Krzysztof Walczak. Classification based on the highest impact jumping emerging patterns. In *International Multiconference on Computer Science and Information Technology*, pages 37–42, 2009.
- [94] Tomasz Gambin and Krzysztof Walczak. A new classification method using array comparative genome hybridization data, based on the concept of limited jumping emerging patterns. *BMC Bioinformatics*, 10(S-1), 2009.
- [95] Venkatesh Ganti, Johannes Gehrke, and Raghu Ramakrishnan. A framework for measuring changes in data characteristics. In *ACM Symposium on Principles of Database Systems (PODS)*, pages 126–137, 1999.
- [96] Venkatesh Ganti, Johannes Gehrke, Raghu Ramakrishnan, and Wei-Yin Loh. A framework for measuring differences in data characteristics. *J. Comput. Syst. Sci.*, 64(3):542–578, 2002.
- [97] Milton Garcia-Borroto. *Searching Extended Emerging Patterns for Supervised Classification*. PhD Thesis, Computer Science Department, National Institute for Astrophysics Optics and Electronics, Puebla, Mexico, 2010.
- [98] Milton García-Borroto, José Francisco Martínez Trinidad, and Jesús Ariel Carrasco-Ochoa. Cascading an emerging pattern based classifier. In *Advances in Pattern Recognition - Second Mexican Conference on Pattern Recognition (MCPR)*, pages 240–249, 2010.
- [99] Milton García-Borroto, José Francisco Martínez Trinidad, and Jesús Ariel Carrasco-Ochoa. A new emerging pattern mining algorithm and its applica-

- tion in supervised classification. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 150–157, 2010.
- [100] Milton García-Borroto, José Francisco Martínez Trinidad, Jesús Ariel Carrasco-Ochoa, Miguel Angel Medina-Pérez, and José Ruiz-Shulcloper. LCMine: An efficient algorithm for mining discriminative regularities and its application in supervised classification. *Pattern Recognition*, 43(9):3025–3034, 2010.
- [101] Gemma C. Garriga, Petra Kralj, and Nada Lavrac. Closed sets for labeled data. *Journal of Machine Learning Research*, 9:559–580, 2008.
- [102] Dominique Gay. *Constraint-based pattern mining for classification purpose*. PhD Thesis, Universit de Nouvelle Caldonie INSA de Lyon, 2009.
- [103] Tao Gu, Shaxun Chen, Xianping Tao, and Jian Lu. An unsupervised approach to activity recognition and segmentation based on object-use fingerprints. *Data & Knowledge Engineering*, 69(6):533 – 544, 2010.
- [104] Tao Gu, Zhanqing Wu, XianPing Tao, Hung Keng Pung, and Jian Lu. epsicar: An emerging patterns based approach to sequential, interleaved and concurrent activity recognition. In *Seventh Annual IEEE International Conference on Pervasive Computing and Communications (PerCom)*, pages 1–9, 2009.
- [105] Tao Gu, Zhanqing Wu, Liang Wang, Xianping Tao, and Jian Lu. Mining emerging patterns for recognizing activities of multiple users in pervasive computing. In *Mobile and Ubiquitous Systems*, 2009.
- [106] Matthias Hagen. Lower bounds for three algorithms for the transversal hypergraph generation. In *Workshop on Graph-Theoretic Concepts in Computer Science*, pages 316–327, 2007.
- [107] Yalei Hao, Gerald Quirchmayr, and Markus Stumptner. Mining MOUCLAS patterns and jumping MOUCLAS patterns to construct classifiers. In *Data Mining - Theory, Methodology, Techniques, and Applications (Selected Papers from AusDM)*, pages 118–129, 2006.
- [108] Céline Hébert and Bruno Crémilleux. Optimized rule mining through a unified framework for interestingness measures. In *Data Warehousing and Knowledge Discovery*, pages 238–247, 2006.

- [109] Francisco Herrera, Cristóbal J. Carmona, Pedro González, and María José del Jesús. An overview on subgroup discovery: foundations and applications. *Knowl. Inf. Syst.*, 29(3):495–525, 2011.
- [110] Robert J. Hilderman and Terry Peckham. Statistical methodologies for mining potentially interesting contrast sets. In *Quality Measures in Data Mining*, pages 153–177. 2007.
- [111] Shiyong Huang and Geoffrey I. Webb. Pruning derivative partial rules during impact rule discovery. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 71–80, 2005.
- [112] Susan P. Imberman, Abdullah Uz Tansel, and Eric Pacuit. An efficient method for finding emerging frequent itemsets. In *International Workshop on Mining Temporal and Sequential Data*, pages 112–121, 2004.
- [113] Susan P. Imberman, Abdullah Uz Tansel, and Eric Pacuit. NUWEP – an efficient method for finding emerging large itemsets. In *Third Workshop on Mining Temporal and Sequential Data at SIGKDD*. 2004.
- [114] Tomasz Imielinski, Leonid Khachiyan, and Amin Abdulghani. Cubegrades: Generalizing association rules. *Data Min. Knowl. Discov.*, 6(3):219–257, 2002.
- [115] H. Inakoshi, T. Ando, A. Sato, and S. Okamoto. Discovery of emerging patterns from nearest neighbors. In *International Conference on Machine Learning and Cybernetics*, 2002.
- [116] Xiaonan Ji. *Constraint Based Sequential Pattern Mining and its Applications*. PhD Thesis, University of Melbourne, 2008.
- [117] Xiaonan Ji, James Bailey, and Guozhu Dong. Mining minimal distinguishing subsequence patterns with gap constraints. In *IEEE International Conference on Data Mining (ICDM)*, pages 194–201, 2005.
- [118] Xiaonan Ji, James Bailey, and Guozhu Dong. Mining minimal distinguishing subsequence patterns with gap constraints. *Knowl. Inf. Syst.*, 11(3):259–286, 2007.
- [119] Ruoming Jin and Gagan Agrawal. Systematic approach for optimizing complex mining tasks on multiple databases. In *International Conference on Data Engineering*, page 17, 2006.

- [120] Ruoming Jin, Yuri Breitbart, and Rong Li. A tree-based framework for difference summarization. In *IEEE International Conference on Data Mining (ICDM)*, pages 209–218, 2009.
- [121] Yoshitaka Kameya, Satoru Nakamura, Tatsuya Iwasaki, and Taisuke Sato. Verbal characterization of probabilistic clusters using minimal discriminative propositions. In *International Conference on Tools with Artificial Intelligence (ICTAI)*, pages 873–875, 2011.
- [122] Yoshitaka Kameya and Chativit Prayoonsri. Pattern-based preservation of building blocks in genetic algorithms. In *IEEE Congress on Evolutionary Computation*, pages 2578–2585, 2011.
- [123] M. Sulaiman Khan, Frans Coenen, David Reid, R. Patel, and L. Archer. A sliding windows based dual support framework for discovering emerging trends from temporal data. *Knowl.-Based Syst.*, 23(4):316–322, 2010.
- [124] Daniel Kifer, Shai Ben-David, and Johannes Gehrke. Detecting change in data streams. In *International Conference on Very Large Data Bases (VLDB)*, pages 180–191, 2004.
- [125] Hyungsul Kim, Sangkyum Kim, Tim Weninger, Jiawei Han, and Tarek F. Abdelzaher. NDPMine: Efficiently mining discriminative numerical features for pattern-based classification. In *ECML/PKDD*, pages 35–50, 2010.
- [126] Jae Kyeong Kim, Hee Seok Song, Tae Seong Kim, and Hyea Kyeong Kim. Detecting the change of customer behavior based on decision tree analysis. *Expert Syst. Appl.*, 22(4), 2005.
- [127] Young Bun Kim. *Comprehensive Data Analysis for Biomarker Pattern Discovery Using DNA/Protein Microarrays*. PhD Thesis, University of Texas at Arlington, 2008.
- [128] Young Bun Kim, Jung Hun Oh, and Jean Gao. Emerging pattern based subspace clustering of microarray gene expression data using mixture models. In *International Conference on Advances in Bioinformatics and its Applications*, 2004.
- [129] Lukasz Kobylinski and Krzysztof Walczak. Efficient mining of jumping emerging patterns with occurrence counts for classification. In *International*

- Conference on Rough Sets and Current Trends in Computing*, pages 419–428, 2008.
- [130] Lukasz Kobylinski and Krzysztof Walczak. Jumping emerging patterns with occurrence count in image classification. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 904–909, 2008.
- [131] Lukasz Kobylinski and Krzysztof Walczak. Jumping emerging substrings in image classification. In *International Conference on Computer Analysis of Images and Patterns*, pages 732–739, 2009.
- [132] Lukasz Kobylinski and Krzysztof Walczak. Spatial emerging patterns for scene classification. In *International Conference on Artificial Intelligence and Soft Computing*, pages 515–522, 2010.
- [133] Petra Kralj, Nada Lavrac, Dragan Gamberger, and Antonija Krstacic. Contrast set mining for distinguishing between similar diseases. In *Artificial Intelligence in Medicine*, pages 109–118, 2007.
- [134] Petra Kralj, Nada Lavrac, Dragan Gamberger, and Antonija Krstacic. Contrast set mining through subgroup discovery applied to brain ischaemia data. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 579–586, 2007.
- [135] Thusjanthan Kubendranathan. Mining multidimensional distinct patterns. Masters thesis, SFU, 2009.
- [136] Hardik Lagad and Guozhu Dong. Comparative web search system and method. United States Patent 7,912,847, March 2011.
- [137] Rob Law, Jia Rong, Huy Quan Vu, Gang Li, and Hee Andy Lee. Identifying changes and trends in Hong Kong outbound tourism. *Tourism Management*, 32(5):1106–1114, 2011.
- [138] Heon Gyu Lee, Kiyong Noh, Bum Ju Lee, Ho-Sun Shon, and Keun Ho Ryu. Cardiovascular disease diagnosis method by emerging patterns. In *Second International Conference on Advanced Data Mining and Applications (ADMA)*, pages 819–826, 2006.
- [139] Jong Bum Lee, Minghao Piao, and Keun Ho Ryu. Incremental emerging patterns mining for identifying safe and non-safe power load lines. In *IEEE*

- International Conference on Computer and Information Technology*, pages 1424–1429, 2010.
- [140] Haiquan Li, Jinyan Li, Limsoon Wong, Mengling Feng, and Yap-Peng Tan. Relative risk and odds ratio: a data mining perspective. In *ACM Symposium on Principles of Database Systems (PODS)*, pages 368–377, 2005.
- [141] Hua-Fu Li. MEMSA: mining emerging melody structures from music query data. *Multimedia Syst.*, 17(3):237–245, 2011.
- [142] Jinyan Li. *Mining Emerging Patterns to Construct Accurate and Efficient Classifiers*. PhD Thesis, University of Melbourne, 2001.
- [143] Jinyan Li, Guozhu Dong, and Kotagiri Ramamohanarao. Instance-based classification by emerging patterns. In *European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)*, pages 191–200, 2000.
- [144] Jinyan Li, Guozhu Dong, and Kotagiri Ramamohanarao. Making use of the most expressive jumping emerging patterns for classification. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 220–232, 2000.
- [145] Jinyan Li, Guozhu Dong, and Kotagiri Ramamohanarao. Making use of the most expressive jumping emerging patterns for classification. *Knowl. Inf. Syst.*, 3(2):131–145, 2001.
- [146] Jinyan Li, Guozhu Dong, Kotagiri Ramamohanarao, and Limsoon Wong. DeEPs: A new instance-based lazy discovery and classification system. *Machine Learning*, 54(2):99–124, 2004.
- [147] Jinyan Li, Guimei Liu, and Limsoon Wong. Mining statistically important equivalence classes and delta-discriminative emerging patterns. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 430–439, 2007.
- [148] Jinyan Li, Huiqing Liu, James R. Downing, Allen Eng-Juh Yeoh, and Limsoon Wong. Simple rules underlying gene expression profiles of more than six subtypes of acute lymphoblastic leukemia (ALL) patients. *Bioinformatics*, 19(1):71–78, 2003.

- [149] Jinyan Li, Thomas Manoukian, Guozhu Dong, and Kotagiri Ramamohanarao. Incremental maintenance on the border of the space of emerging patterns. *Data Min. Knowl. Discov.*, 9(1):89–116, 2004.
- [150] Jinyan Li, Kotagiri Ramamohanarao, and Guozhu Dong. Emerging patterns and classification. In *Asian Computing Science Conference*, pages 15–32, 2000.
- [151] Jinyan Li, Kotagiri Ramamohanarao, and Guozhu Dong. Combining the strength of pattern frequency and distance for classification. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 455–466, 2001.
- [152] Jinyan Li and Limsoon Wong. Geography of differences between two classes of data. In *European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)*, pages 325–337, 2002.
- [153] Jinyan Li and Limsoon Wong. Identifying good diagnostic gene groups from gene expression profiles using the concept of emerging patterns. *Bioinformatics*, 18(10):1406–1407, 2002.
- [154] Jinyan Li and Limsoon Wong. Solving the fragmentation problem of decision trees by discovering boundary emerging patterns. In *IEEE International Conference on Data Mining (ICDM)*, pages 653–656, 2002.
- [155] Jinyan Li and Limsoon Wong. Structural geography of the space of emerging patterns. *Intell. Data Anal.*, 9(6):567–588, 2005.
- [156] Jinyan Li and Qiang Yang. Strong compound-risk factors: Efficient discovery through emerging patterns and contrast sets. *IEEE Transactions on Information Technology in Biomedicine*, 11(5):544–552, 2007.
- [157] Jinyan Li, Xiuzhen Zhang, Guozhu Dong, Kotagiri Ramamohanarao, and Qun Sun. Efficient mining of high confidence association rules without support thresholds. In *European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)*, pages 406–411, 1999.
- [158] Jiuyong Li, Rodney Topor, and Hong Shen. Construct robust rule sets for classification. In *ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, pages 564–569. ACM press, 2002.

- [159] Tao Li, Mitsunori Ogihara, and Shenghuo Zhu. Association-based similarity testing and its applications. *Intell. Data Anal.*, 7(3):209–232, 2003.
- [160] Wenmin Li, Jiawei Han, and Jian Pei. CMAR: Accurate and efficient classification based on multiple class-association rules. In *IEEE International Conference on Data Mining (ICDM)*, pages 369–376, 2001.
- [161] Yan Li and Xiguang Dong. The e-mail categorization and filtering technology based on eEP. In *International Symposium on Computer Science and Computational Technology (ISCST)*, pages 259–262. 2010.
- [162] Yingjiu Li, Sencun Zhu, Xiaoyang Sean Wang, and Sushil Jajodia. Looking into the seeds of time: Discovering temporal patterns in large transaction sets. *Inf. Sci.*, 176(8):1003–1031, 2006.
- [163] Jessica Lin and Eamonn J. Keogh. Group SAX: Extending the notion of contrast sets to time series and multimedia data. In *European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)*, pages 284–296, 2006.
- [164] Zhenhua Lin. Mining discriminative items in multiple data streams. Masters thesis, SFU, 2010.
- [165] Zhenhua Lin, Bin Jiang, Jian Pei, and Daxin Jiang. Mining discriminative items in multiple data streams. *World Wide Web*, 13:497–522, December 2010.
- [166] Bing Liu, Wynne Hsu, Heng-Siew Han, and Yiyuan Xia. Mining changes for real-life applications. In *International Conference on Data Warehousing and Knowledge Discovery (DaWaK)*, pages 337–346, 2000.
- [167] Bing Liu, Wynne Hsu, and Yiming Ma. Integrating classification and association rule mining. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 80–86, 1998.
- [168] Bing Liu, Wynne Hsu, and Yiming Ma. Discovering the set of fundamental rule changes. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 335–340, 2001.
- [169] Bing Liu, Ke Wang, Lai-Fun Mun, and Xin-Zhi Qi. Using decision tree induction for discovering holes in data. In *Pacific Rim International Conference on Artificial Intelligence*, pages 182–193, 1998.

- [170] Duen-Ren Liu, Meng-Jung Shih, Churn-Jung Liau, and Chin-Hui Lai. Mining the change of event trends for decision support in environmental scanning. *Expert Syst. Appl.*, 36(2):972–984, 2009.
- [171] Qingbao Liu and Guozhu Dong. A contrast pattern based clustering quality index for categorical data. In *IEEE International Conference on Data Mining (ICDM)*, pages 860–865, 2009.
- [172] Xiaoyan Liu, Xindong Wu, Huaiqing Wang, Rui Zhang, James Bailey, and Kotagiri Ramamohanarao. Mining distribution change in stock order streams. In *IEEE International Conference on Data Engineering (ICDE)*, pages 105–108, 2010.
- [173] Yong Liu, Jianzhong Li, and Jinghua Zhu. A novel graph classification approach based on frequent closed emerging patterns. *Journal of Computer Research and Development*, 44(7):1169–1176, 2007.
- [174] David Lo, Hong Cheng, Jiawei Han, Siau-Cheng Khoo, and Chengnian Sun. Classification of software behaviors for failure detection: a discriminative pattern mining approach. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 557–566, 2009.
- [175] David Lo, Hong Cheng, and Lucia. Mining closed discriminative dyadic sequential patterns. In *International Conference on Extending Database Technology (EDBT)*, pages 21–32, 2011.
- [176] Elsa Loekito. *Mining Simple and Complex Patterns Efficiently Using Binary Decision Diagrams*. PhD Thesis, University of Melbourne, 2009.
- [177] Elsa Loekito and James Bailey. Mining influential attributes that capture class and group contrast behaviour. In *ACM Conference on Information and Knowledge Management (CIKM)*, pages 971–980, 2008.
- [178] Elsa Loekito and James Bailey. Using highly expressive contrast patterns for classification - is it worthwhile? In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 483–490, 2009.
- [179] Sylvain Lozano, Guillaume Poezevara, Marie-Pierre Halm-Lemeille, Elodie Lescot-Fontaine, Alban Lepailleur, Ryan Bissell-Siders, Bruno Cremilleux, Sylvain Rault, Bertrand Cuissart, and Ronan Bureau. Introduction of jumping fragments in combination with qsars for the assessment of classification in

- ecotoxicology. *Journal of Chemical Information and Modeling*, 50(8):1330–1339, 2010.
- [180] Hassan H. Malik and John R. Kender. Classifying high-dimensional text and web data using very short patterns. In *IEEE International Conference on Data Mining (ICDM)*, pages 923–928, 2008.
- [181] Shihong Mao. *Comparative Microarray Data Mining*. PhD Thesis, Wright State University, 2007.
- [182] Shihong Mao and Guozhu Dong. Discovery of highly differentiative gene groups from microarray gene expression data using the gene club approach. *J. Bioinformatics and Computational Biology*, 3(6):1263–1280, 2005.
- [183] Shihong Mao, Charles Wang, and Guozhu Dong. Evaluation of inter-laboratory and cross-platform concordance of DNA microarrays through discriminating genes and classifier transferability. *J. Bioinformatics and Computational Biology*, 7(1):157–173, 2009.
- [184] Fabian Mörchen, Mathäus Dejori, Dmitriy Fradkin, Julien Etienne, Bernd Wachmann, and Markus Bundschuh. Anticipating annotations and emerging trends in biomedical literature. In *ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*, pages 954–962, 2008.
- [185] Hiroyuki Morita, Takanobu Nakahara, Hamuro, and Shoji Yamamoto. Decision tree-based classifier incorporating contrast pattern. In *IEEE International Symposium on Consumer Electronics*. 2009.
- [186] Maybin K. Muyebe, Muhammad S. Khan, Spits Warnars, and John A. Keane. A framework to mine high-level emerging patterns by attribute-oriented induction. In *International Conference on Intelligent Data Engineering and Automated Learning (IDEAL)*, pages 170–177, 2011.
- [187] Sébastien Nedjar. *Cubes Emergents pour l’analyse des renversements de tendances dans les bases de données multidimensionnelles*. PhD Thesis, Doctorat Aix-Marseille Université délivré par l’ Université de la Méditerranée, 2009.
- [188] Sébastien Nedjar, Alain Casali, Rosine Cicchetti, and Lotfi Lakhal. Emerging cubes for trends analysis in OLAP databases. In *International Con-*

- ference on Data Warehousing and Knowledge Discovery (DaWaK)*, pages 135–144, 2007.
- [189] Sébastien Nedjar, Alain Casali, Rosine Cicchetti, and Lotfi Lakhal. Emerging cubes: Borders, size estimations and lossless reductions. *Inf. Syst.*, 34(6):536–550, 2009.
- [190] Sébastien Nedjar, Alain Casali, Rosine Cicchetti, and Lotfi Lakhal. Reduced representations of emerging cubes for OLAP database mining. *International Journal of Business Intelligence and Data Mining*, 4(3/4):267–300, 2009.
- [191] Sébastien Nedjar, Rosine Cicchetti, and Lotfi Lakhal. Extracting semantics in OLAP databases using emerging cubes. *Information Sciences*, 2011.
- [192] Thanh-Son Ngo, Mengling Feng, Guimei Liu, and Limsoon Wong. Efficiently finding the best parameter for the emerging pattern-based classifier pcl. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 121–133, 2010.
- [193] Petra Kralj Novak, Nada Lavrac, Dragan Gamberger, and Antonija Krstacic. Csm-sd: Methodology for contrast set mining through subgroup discovery. *Journal of Biomedical Informatics*, 42(1):113–122, 2009.
- [194] Petra Kralj Novak, Nada Lavrac, and Geoffrey I. Webb. Supervised descriptive rule discovery: A unifying survey of contrast set, emerging pattern and subgroup mining. *Journal of Machine Learning Research*, 10:377–403, 2009.
- [195] Indranil Palit, Chandan K. Reddy, and Kendra Schwartz. Differential predictive modeling for racial disparities in breast cancer. In *IEEE International Conference on Bioinformatics and BioMedicine (BIBM)*, 2009.
- [196] Jin Hyoung Park, Heon Gyu Lee, and Jong Heung Park. Real-time diagnosis system using incremental emerging pattern mining. In *5th International Conference on Ubiquitous Information Technologies and Applications (CUTE)*, pages 1–5, 2010.
- [197] Jin Hyoung Park, Heon Gyu Lee, Gyoyong Sohn, Jin-Ho Shin, and Keun Ho Ryu. Emerging pattern based classification for automated non-safe power line detection. In *International Conference on Fuzzy Systems and Knowledge Discovery (FSKD)*, pages 169–173, 2009.

- [198] Srinivasan Parthasarathy and Mitsunori Ogihara. Exploiting dataset similarity for distributed mining. In *IPDPS Workshops*, pages 399–406, 2000.
- [199] Minghao Piao, Heon Gyu Lee, Gyooyong Sohn, Gouchol Pok, and Keun Ho Ryu. Emerging patterns based methodology for prediction of patients with myocardial ischemia. In *International Conference on Fuzzy Systems and Knowledge Discovery (FSKD)*, pages 174–178, 2009.
- [200] Minghao Piao, Jong Bum Lee, Ho-Sun Shon, Unil Yun, and Keun Ho Ryu. Enumeration tree based emerging patterns mining by using two different supports. In *5th International Conference on Convergence and Hybrid Information Technology (ICHIT)*, pages 708–715, 2011.
- [201] Roman Podraza and Krzysztof Tomaszewski. Ordinal credibility coefficient - a new approach in the data credibility analysis. In *11th International Conference on Rough Sets, Fuzzy Sets, Data Mining and Granular Computing*, pages 190–198, 2007.
- [202] Guillaume Poezevara, Bertrand Cuissart, and Bruno Crémilleux. Discovering emerging graph patterns from chemicals. In *International Symposium on Foundations of Intelligent Systems (ISMIS)*, pages 45–55, 2009.
- [203] Guillaume Poezevara, Bertrand Cuissart, and Bruno Crémilleux. Extracting and summarizing the frequent emerging graph patterns from a dataset of graphs. *J. Intell. Inf. Syst.*, 37(3):333–353, 2011.
- [204] Xiaoyuan Qian, James Bailey, and Christopher Leckie. Mining generalised emerging patterns. In *Australian Conference on Artificial Intelligence*, pages 295–304, 2006.
- [205] Yongsong Qin, Shichao Zhang, Xiaofeng Zhu, Jilian Zhang, and Chengqi Zhang. Estimating confidence intervals for structural differences between contrast groups with missing data. *Expert Syst. Appl.*, 36(3):6431–6438, 2009.
- [206] Kotagiri Ramamohanarao. Contrast pattern mining and its application for building robust classifiers. In *Discovery Science*, page 380, 2010.
- [207] Kotagiri Ramamohanarao. Contrast pattern mining and its application for building robust classifiers. In *International Conference on Algorithmic Learning Theory (ALT)*, page 33, 2010.

- [208] Kotagiri Ramamohanarao and James Bailey. Discovery of emerging patterns and their use in classification. In *Australian Conference on Artificial Intelligence*, pages 1–12, 2003.
- [209] Kotagiri Ramamohanarao and Hongjian Fan. Patterns based classifiers. In *World Wide Web*, pages 71–83, 2007.
- [210] Khalid E. K. Saeed, Heon Gyu Lee, Wun-Jae Kim, Eun Jong Cha, and Keun Ho Ryu. Using emerging subsequence in classifying protein structural class. In *International Conference on Fuzzy Systems and Knowledge Discovery (FSKD)*, pages 349–353, 2009.
- [211] Amit Satsangi. *Data Mining Using Contrast-sets: A Comparative Study*. MS Thesis, University of ALBERTA, 2011.
- [212] Amit Satsangi and Osmar R. Zaïane. Contrasting the contrast sets: An alternative approach. In *International Database Engineering and Applications Symposium*, pages 114–119, 2007.
- [213] Yohji Shidara, Atsuyoshi Nakamura, and Mineichi Kudo. CCIC: Consistent common itemsets classifier. In *5th International Conference on Machine Learning and Data Mining in Pattern Recognition (MLDM)*, pages 490–498, 2007.
- [214] Mondelle Simeon and Robert J. Hilderman. Exploratory quantitative contrast set mining: A discretization approach. In *IEEE International Conference on Tools with Artificial Intelligence (ICTAI)*, pages 124–131, 2007.
- [215] Mondelle Simeon and Robert J. Hilderman. Exploratory quantitative contrast set mining: A discretization approach. In *IEEE International Conference on Tools with Artificial Intelligence (ICTAI)*, pages 124–131, 2007.
- [216] Mondelle Simeon and Robert J. Hilderman. Cosine: A vertical group difference approach to contrast set mining. In *Canadian Conference on AI*, pages 359–371, 2011.
- [217] Mondelle Simeon and Robert J. Hilderman. Gencs: A correlated group difference approach to contrast set mining. In *Machine Learning and Data Mining in Pattern Recognition*, pages 140–154, 2011.

- [218] Hee Seok Song, Jae Kyeong Kim, and Soung Hie Kim. Mining the change of customer behavior in an internet shopping mall. *Expert Syst. Appl.*, 21(3):157–168, 2001.
- [219] Arnaud Soulet, Bruno Crémilleux, and François Rioult. Condensed representation of emerging patterns. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 127–132, 2004.
- [220] Arnaud Soulet, Bruno Crémilleux, and François Rioult. Condensed representation of EPs and patterns quantified by frequency-based measures. In *International Workshop on Knowledge Discovery in Inductive Databases*, pages 173–190, 2004.
- [221] Arnaud Soulet and C. Hébert. Using emerging patterns from clusters to characterize social subgroups of patients affected by atherosclerosis. In *Discovery Challenge Workshop co-located with ECML/PKDD’04*, 2004.
- [222] Michael Steinbach, Haoyu Yu, Gang Fang, and Vipin Kumar. Using constraints to generate and explore higher order discriminative patterns. In *Advances in Knowledge Discovery and Data Mining - 15th Pacific-Asia Conference (PAKDD)*, pages 338–350, 2011.
- [223] Tomasz F. Stepinski, Wei Ding, and Christoph F. Eick. Discovering controlling factors of geospatial variables. In *ACM SIGSPATIAL International Symposium on Advances in Geographic Information Systems (GIS)*, page 47, 2008.
- [224] Tomasz F. Stepinski, Josue Salazar, and Wei Ding. Discovering spatio-social motifs of electoral support using discriminative pattern mining. In *1st International Conference and Exhibition on Computing for Geospatial Research & Application (COM.Geo)*, 2010.
- [225] Qun Sun, Xiuzhen Zhang, and Kotagiri Ramamohanarao. Noise tolerance of EP-based classifiers. In *Australian Conference on Artificial Intelligence*, pages 796–806, 2003.
- [226] Yanmin Sun, Yang Wang, and Andrew K. C. Wong. Boosting an associative classifier. *IEEE Trans. Knowl. Data Eng.*, 18(7):988–992, 2006.

- [227] Nobuyuki Takahashi, Atsushi Takizawa, Naoki Katoh, and Wonyong Koo. Analysis of kansei evaluation on entrance halls of rental office buildings by CAEP. *Journal of Architecture and Planning*, 74(640):1403–1410, 2009.
- [228] Atsushi Takizawa. Classification and feature extraction of criminal occurrence points using CAEP with transductive clustering. *Procedia - Social and Behavioral Sciences*, 21:83–92, 2011.
- [229] Atsushi Takizawa, Fumie Kawaguchi, Naoki Katoh, Kenji Mori, and Kazuo Yoshida. Risk discovery of car-related crimes from urban spatial attributes using emerging patterns. *KES Journal*, 11(5):301–311, 2007.
- [230] Atsushi Takizawa, Wonyong Koo, and Naoki Katoh. Discovering distinctive spatial patterns of snatch theft in Kyoto City with CAEP. *Journal of Asian Architecture and Building Engineering*, 9(1):103–110, 2010.
- [231] Fung Michael Tang. *Sequence classification and melody tracks selection*. Master of Philosophy Thesis, University of Hong Kong, 2001.
- [232] Pawel Terlecki. *On the Relation between Jumping Emerging Patterns and Rough Set Theory with Application to Data Classification*. PhD Thesis, Institute of Computer Science, Warsaw University of Technology, 2009. Winner of Polish Prime Minister’s Award for PhD thesis.
- [233] Pawel Terlecki. On the relation between jumping emerging patterns and rough set theory with application to data classification. *Transactions on Rough Sets XII*, 12:236–338, 2010.
- [234] Pawel Terlecki and Krzysztof Walczak. Local reducts and jumping emerging patterns in relational databases. In *International Conference on Rough Sets and Current Trends in Computing*, pages 358–367, 2006.
- [235] Pawel Terlecki and Krzysztof Walczak. Jumping emerging pattern induction by means of graph coloring and local reducts in transaction databases. In *International Conference on Rough Sets, Fuzzy Sets, Data Mining and Granular Computing*, pages 363–370, 2007.
- [236] Pawel Terlecki and Krzysztof Walczak. Jumping emerging patterns with negation in transaction databases - classification and discovery. *Inf. Sci.*, 177(24):5675–5690, 2007.

- [237] Pawel Terlecki and Krzysztof Walczak. On the relation between rough set reducts and jumping emerging patterns. *Inf. Sci.*, 177(1):74–83, 2007.
- [238] Pawel Terlecki and Krzysztof Walczak. Adaptive classification with jumping emerging patterns. In *Third International Conference on Rough Sets and Knowledge Technology*, pages 39–46, 2008.
- [239] Pawel Terlecki and Krzysztof Walczak. Efficient discovery of top-k minimal jumping emerging patterns. In *6th International Conference on Rough Sets and Current Trends in Computing*, pages 438–447, 2008.
- [240] Pawel Terlecki and Krzysztof Walczak. Local projection in jumping emerging patterns discovery in transaction databases. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 723–730, 2008.
- [241] Fadi A. Thabtah. A review of associative classification mining. *Knowledge Eng. Review*, 22(1):37–65, 2007.
- [242] M. Thangaraj and C. R. Vijayalakshmi. A study on classification approaches across multiple database relations. *International Journal of Computer Applications*, 12(12):1–6, 2011.
- [243] Roger Ming Hieng Ting and James Bailey. Mining minimal contrast subgraph patterns. In *SIAM International Conference on Data Mining (SDM)*, 2006.
- [244] Chieh-Yuan Tsai and Yu-Chen Shieh. A change detection method for sequential patterns. *Decision Support Systems*, 46(2):501–511, 2009.
- [245] George Tzanis, Ioannis Kavakiotis, and Ioannis P. Vlahavas. Polyadenylation site prediction using interesting emerging patterns. In *IEEE International Conference on Bioinformatics and Bioengineering (BIBE)*, pages 1–7, 2008.
- [246] George Tzanis, Ioannis Kavakiotis, and Ioannis P. Vlahavas. PolyA-iEP: A data mining method for the effective prediction of polyadenylation sites. *Expert Syst. Appl.*, 38(10):12398–12408, 2011.
- [247] Matthijs van Leeuwen. Maximal exceptions with minimal descriptions. *Data Min. Knowl. Discov.*, 21(2):259–276, 2010.

- [248] Matthijs van Leeuwen and Arno Siebes. Streamkrimp: Detecting change in data streams. In *ECML/PKDD*, pages 672–687, 2008.
- [249] Peerapon Vateekul and Mei-ling Shyu. A conflict-based confidence measure for associative classification. In *Information Reuse and Integration*, pages 256–261, 2008.
- [250] Adriano Veloso, Wagner Meira Jr., and Mohammed J. Zaki. Lazy associative classification. In *IEEE International Conference on Data Mining (ICDM)*, pages 645–654, 2006.
- [251] Jilles Vreeken, Matthijs van Leeuwen, and Arno Siebes. Characterising the difference. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 765–774, 2007.
- [252] Qian Wan and Aijun An. Discovering transitional patterns and their significant milestones in transaction databases. *IEEE Trans. Knowl. Data Eng.*, 21(12):1692–1707, 2009.
- [253] Haijun Wang, Yaping Lin, Xinguo Lu, and Yalin Nie. A novel EPA-KNN gene classification algorithm. In *4th International Symposium on Neural Networks (ISNN)*, pages 1254–1263, 2007.
- [254] Jianyong Wang and George Karypis. On mining instance-centric classification rules. *IEEE Trans. Knowl. Data Eng.*, 18(11):1497–1511, 2006.
- [255] Ke Wang, Senqiang Zhou, Ada Wai-Chee Fu, and Jeffrey Xu Yu. Mining changes of classification by correspondence tracing. In *SIAM International Conference on Data Mining (SDM)*, 2003.
- [256] Liang Wang, Yizhou Wang, and Debin Zhao. Building emerging pattern (EP) random forest for recognition. In *International Conference on Image Processing (ICIP)*, pages 1457–1460, 2010.
- [257] Lusheng Wang, Hao Zhao, Guozhu Dong, and Jianping Li. On the complexity of finding emerging patterns. *Theor. Comput. Sci.*, 335(1):15–27, 2005.
- [258] Zhou Wang, Hongjian Fan, and Kotagiri Ramamohanarao. Exploiting maximal emerging patterns for classification. In *Australian Conference on Artificial Intelligence*, pages 1062–1068, 2004.

- [259] Geoffrey I. Webb. Discovering significant patterns. *Machine Learning*, 68(1):1–33, 2007.
- [260] Geoffrey I. Webb, Shane M. Butler, and Douglas A. Newlands. On detecting differences between groups. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 256–265, 2003.
- [261] Tzu-Tsung Wong and Kuo-Lung Tseng. Mining negative contrast sets from data with discrete attributes. *Expert Syst. Appl.*, 29(2):401–407, 2005.
- [262] Stefan Wrobel. An algorithm for multi-relational discovery of subgroups. In *European Conference on Principles and Practice of Knowledge Discovery in Databases (PKDD)*, pages 78–87, 1997.
- [263] Baohua Wu, Lei Duan, Zhonghua Yu, Changjie Tang, and Jun Zhu. Birth defects detection algorithm based on emerging patterns. *Journal of Computer Applications*, 31(4):885–889, 2011.
- [264] Zhengzheng Xing, Jian Pei, Philip S. Yu, and Ke Wang. Extracting interpretable features for early classification on time series. In *SIAM International Conference on Data Mining (SDM)*, 2011.
- [265] Jingfeng Xue and Yuanda Cao. Application and research of aggregation emerging pattern in intrusion detection. *Computer Application and Software*, 22, 2005.
- [266] Jingfeng Xue, Changzhen Hu, Kunsheng Wang, Rui Ma, and Jiaxin Zou. Metamorphic malware detection technology based on aggregating emerging patterns. In *Int. Conf. Interaction Sciences*, pages 1293–1296, 2009.
- [267] Xifeng Yan, Philip S. Yu, and Jiawei Han. Graph indexing based on discriminative frequent structure analysis. *ACM Trans. Database Syst.*, 30(4):960–993, 2005.
- [268] Guangfei Yang, Shingo Mabu, Kaoru Shimada, and Kotaro Hirasawa. An evolutionary approach to rank class association rules with feedback mechanism. *Expert Syst. Appl.*, 38(12):15040–15048, 2011.
- [269] Ying Yang, Xindong Wu, and Xingquan Zhu. Mining in anticipation for concept change: Proactive-reactive prediction in data streams. *Data Min. Knowl. Discov.*, 13(3):261–289, 2006.

- [270] Xiaoxin Yin and Jiawei Han. CPAR: Classification based on predictive association rules. In *SIAM International Conference on Data Mining (SDM)*, 2003.
- [271] Hye-Sung Yoon, Sang-Ho Lee, and Ju Han Kim. Application of emerging patterns for multi-source bio-data classification and analysis. In *International Conference on Natural Computation (ICNC)*, pages 965–974, 2005.
- [272] Yongwook Yoon and Gary Geunbae Lee. Subcellular localization prediction through boosting association rules. *IEEE/ACM transactions on computational biology and bioinformatics*, 2011.
- [273] Kui Yu, Xindong Wu, Wei Ding, and Hao Wang. Causal associative classification. In *IEEE International Conference on Data Mining (ICDM)*, 2011.
- [274] Larry T. H. Yu, Fu-Lai Chung, Stephen Chi fai Chan, and Simon M. C. Yuen. Using emerging pattern based projected clustering and gene expression data for cancer detection. In *Asia-Pacific Bioinformatics Conference (APBC)*, pages 75–84, 2004.
- [275] Jilian Zhang, Shichao Zhang, Xiaofeng Zhu, Xindong Wu, and Chengqi Zhang. Measuring the uncertainty of differences for contrasting groups. In *AAAI Conference on Artificial Intelligence*, pages 1920–1921, 2007.
- [276] Shaoyi Zhang, Kotagiri Ramamohanarao, and James C. Bezdek. EP-based robust weighting scheme for fuzzy SVMs. In *Australasian Database Conference (ADC)*, pages 123–132, 2010.
- [277] Shichao Zhang. Detecting differences between contrast groups. *IEEE Transactions on Information Technology in Biomedicine*, 12(6):739–745, 2008.
- [278] Shichao Zhang, Feng Chen, Zhi Jin, and Ruili Wang. Mining class-bridge rules based on rough sets. *Expert Syst. Appl.*, 36(3):6453–6460, 2009.
- [279] Xiuzhen Zhang. *Emerging Patterns: Efficient Constraint-Based Mining and the Aggregation Approach for Classification*. PhD Thesis, University of Melbourne, 2001.
- [280] Xiuzhen Zhang, Guozhu Dong, and Kotagiri Ramamohanarao. Exploring constraints to efficiently mine emerging patterns from large high-dimensional datasets. In *ACM International Conference on Knowledge Discovery and Data Mining (KDD)*, pages 310–314, 2000.

- [281] Xiuzhen Zhang, Guozhu Dong, and Kotagiri Ramamohanarao. Information-based classification by aggregating emerging patterns. In *Intelligent Data Engineering and Automated Learning (IDEAL)*, pages 48–53, 2000.
- [282] Xiuzhen Zhang, Guozhu Dong, and Kotagiri Ramamohanarao. Building behaviour knowledge space to make classification decision. In *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, pages 488–494, 2001.
- [283] Yuhai Zhao, Guoren Wang, Yuan Li, and Zhanghui Wang. Finding novel diagnostic gene patterns based on interesting non-redundant contrast sequence rules. In *IEEE International Conference on Data Mining (ICDM)*, pages 972–981, 2011.
- [284] Xingquan Zhu and Xindong Wu. Discovering relational patterns across multiple databases. In *International Conference on Data Engineering (ICDE)*, pages 726–735, 2007.