

Dear colleagues,

We are going to host the following workshop at ICDM 2024 Conference.

Paper Submission: Deadline: September 10, 2024

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Optimization Based Techniques for Emerging Data Mining Problems

- Workshop of OEDM 2024

Abu Dhabi, UAE, December 9-12, 2024

<https://icdm2024.org/>

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### 1. Scope of the Workshop:

Using optimization techniques to deal with data separation and data analysis goes back to more than thirty years ago. According to O. L. Mangasarian, his group has formulated linear programming as a large margin classifier in 1960's. Nowadays classical optimization techniques have found widespread use in solving various data mining problems, among which convex optimization and mathematical programming have occupied the center-stage. With the advantage of convex optimization's elegant property of global optimum, many problems can be cast into the convex optimization framework, such as Support Vector Machines, graph-based manifold learning, and clustering, which can usually be solved by convex Quadratic Programming, Semi-Definite Programming or Eigenvalue Decomposition. Another research emphasis is applying mathematical programming into the classification. For the last twenty years, the researchers have extensively applied quadratic programming into classification, known as V. Vapnik's Support Vector Machine, as well as various applications.

As time goes by, new problems emerge constantly in data mining community, such as Time-Evolving Data Mining, On-Line Data Mining, Relational Data Mining and Transferred Data Mining. Some of these recently emerged problems are more complex than traditional ones and are usually formulated as nonconvex problems. Therefore some general optimization methods, such as gradient descents, coordinate descents, convex relaxation, have come back to the stage and become more and more popular in recent years. From another side of mathematical programming, In 1970's, A. Charnes and W.W. Cooper initiated Data Envelopment Analysis where a fractional programming is used to evaluate decision making units, which is economic representative data in a given training dataset. From 1980's to 1990's, F. Glover proposed a number of linear programming models to solve discriminant problems with a small sample size of data. Then, since 1998, multiple criteria linear programming (MCLP) and multiple criteria quadratic programming (MQLP) has also extended in classification. All of these methods differ from statistics, decision tree induction, and neural networks. So far, there are more than 200 scholars around the world have been actively working on the field of using optimization techniques to handle data mining problems.

This workshop will present recent advances in optimization techniques for, especially new emerging, data mining problems, as well as the real-life applications among. One main goal of the workshop is to bring together the leading researchers who work on state-of-the-art algorithms on optimization based methods for modern data analysis, and also the practitioners who seek for novel applications. In summary, this workshop will strive to emphasize the following aspects:

- Presenting recent advances in algorithms and methods using optimization techniques
- Addressing the fundamental challenges in data mining using optimization techniques
- Identifying killer applications and key industry drivers (where theories and applications meet)
- Fostering interactions among researchers (from different backgrounds) sharing the same interest to promote cross-fertilization of ideas.
- Exploring benchmark data for better evaluation of the techniques

### 3. Topic Areas

This workshop intends to promote the research interests in the connection of optimization and data mining as well as real-life applications among the growing data mining communities. It calls for papers to the researchers in the above interface fields for their participation in the conference. The workshop welcomes both high-quality academic (theoretical or empirical) and practical papers in the broad ranges of optimization and data mining related topics including, but not limited to the following:

- Convex optimization for data mining problems
- Multiple criteria and constraint programming for data mining problems
- Nonconvex optimization (Gradient Descents, DC Programming...)
- Linear and nonlinear programming based methods
- Matrix/Tensor based methods (PCA, SVD, NMF, Parafac, Tucker...)
- Large margin methods (SVM, Maximum Margin Clustering...)
- Randomized algorithms (Random Projection, Random Sampling...)
- Sparse algorithms (Lasso, Elastic Net, Structural Sparsity...)
- Regularization techniques (L2 norm, Lp,q norm, Nuclear Norm...)
- Combinatorial optimization
- Large scale numerical optimization
- Stochastic optimization
- Graph analysis
- Deep Reinforcement Learning
- Learning from label proportions
- Knowledge Graph
- Optimization for large language models

#### Application areas

In addition to attract the technical papers, this workshop will particularly encourage the submissions of optimization-based data mining applications, such as credit assessment management, information intrusion, bio-informatics, etc. as follows:

- Association rules by optimization
- Artificial intelligence and optimization
- Bio-informatics and optimization
- Cluster analysis by optimization
- Collaborative filtering
- Credit scoring and data mining
- Data mining and financial applications
- Financial forecasting
- Image processing and analysis
- Information retrieval by optimization
- Multiple criteria decision making in data mining

- Optimization and classification
- Smart library
- Social data science
- Social Networks analysis
- Text processing and information retrieval
- Visualization and optimization
- Web search and decision making
- Web mining and optimization

#### 4. Workshop Organizers:

General Co-Chair:

Prof. Shi Yong, University of Nebraska at Omaha /Chinese Academy of Sciences , Email: [yshi@ucas.ac.cn](mailto:yshi@ucas.ac.cn)

Program Co-Chairs:

Prof. Chris Ding, University of Texas at Arlington, Email: [chqding@cse.uta.edu](mailto:chqding@cse.uta.edu)

Prof. Yingjie Tian, Chinese Academy of Sciences, Email: [tyj@ucas.ac.cn](mailto:tyj@ucas.ac.cn)

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Assistant Prof. Fan Meng, Peking University, Email: [mengfan@pku.edu.cn](mailto:mengfan@pku.edu.cn)

#### 5. Important Dates:

- September 10, 2024: Workshop papers submission (Workshop submission page will be open soon.)
- October 7, 2024: Notification of workshop papers acceptance to authors
- October 11, 2023: Camera-ready deadline and copyright form
- December 9, 2023: Workshops date

\*\*All times are at 11:59PM AOE\*\*

#### 6. Tentative PC.

- Shingo Aoki, Osaka Prefecture University, Japan
- Wanpracha Art Chaovaitwongse, Rutgers, the State University of New Jersey, USA
- Zhensong Chen, Capital University of Business and Economics, China
- Ian Davidson, University of California, Davis
- Bin Gao, Microsoft Research Asia
- Guangyan Huang, Victoria University
- Heng Huang, University of Texas at Arlington
- Masato Koda, University of Tsukuba, Japan
- Gang Kou, University of Electronic Science and Technology of China, China
- Brian Kulis, University of California at Berkeley
- James Kwok, Hongkong University of Science and Technology
- Kin Keung Lai, City University of Hong Kong, Hong Kong, China
- Heeseok Lee, Korea Advanced Institute Science and Technology, Korea
- Minglong Lei, Beijing University of Technology, China
- Biao Li, , University of Electronic Science and Technology of China, China
- Jianping Li, University of Chinese Academy of Sciences, China
- Yingjie Tian, University of Chinese Academy of Sciences, China
- Lingfeng Niu, University of Chinese Academy of Sciences, China

- David Olson, University of Nebraska at Lincoln, USA
- Yi Peng, University of Electronic Science and Technology of China, China
- Fei Sha, University of Southern California
- Vikas Sindhvani, IBM T. J. Watson Research Center
- Masashi Sugiyama, Tokyo Institute of Technology
- Jimeng Sun, IBM T. J. Watson Research Center
- Yangqiu Song, Microsoft Research Asia
- Jie Tang, Tsinghua University, China
- Dacheng Tao, University of Technology, Sydney, Australia
- Gang Wang, Tencent Technologies Inc. China
- John Wang, Montclair State University, USA
- Huadong Wang, Tsinghua University, China
- Shouyang Wang, Chinese Academy of Sciences, China
- Linli Xu, University of Science and Technology, China
- Shuicheng Yan, National University of Singapore
- Xiaobo Yang, Daresbury Laboratory, Warrington, UK
- Kai Zhang, Siemens Corporate Research, Princeton
- Ning Zhong, Maebashi Institute of Technology, Japan
- Xiaofei Zhou, Chinese Academy of Sciences, China