

# MINGMING GONG

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## EDUCATION

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<b>University of Technology Sydney (UTS), Sydney, Australia</b> Ph.D. in Analytics Thesis: Causal and Causally-inspired Learning Advisor: Prof. Dacheng Tao Co-advisor: Assistant Prof. Kun Zhang (Carnegie Mellon University)	08/2012- 08/2017
<b>Huazhong University of Science and Technology (HUST), Wuhan, China</b> M.Eng. in Communications and Information System Thesis: Image Matching and Recognition based on Local Features Advisor: Prof. Xinge You	09/2009- 03/2012
<b>Nanjing University (NJU), Nanjing, China</b> B.Sc. in Electronic Information Science and Technology Thesis: Classification of Acoustic Emission Signals using Wavelet Transform Advisor: Prof. Jing Yang	09/2005 - 06/2009

## RESEARCH INTERESTS

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<b>Causal Inference</b>	causal structure learning, time series analysis
<b>Machine Learning</b>	transfer learning, deep learning, graphical models
<b>Computer Vision</b>	pose estimation, depth estimation, semantic segmentation
<b>Heathcare</b>	statistical genetics, medical image analysis

## RESEARCH EXPERIENCE

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**Postdoc, University of Pittsburgh & Carnegie Mellon University** 05/2017 - present  
*Advisor: Prof Kayhan Batmanghelich and Prof Kun Zhang*

- Proposed a deep ordinal regression network for single-image depth estimation. **Our method won the 1st prize in single-image depth prediction competition in CVPR Robust Vision Challenge 2018.** (CVPR'18a)
- Studied the theoretical problems in causal discovery under measurement noise and developed robust causal discovery algorithms. **This is the first theory on the identifiability of causal relations from noisy data.** (UAI'18)
- Developed adaptive nonparametric domain transfer methods by causal generative modeling. Our method is the first method which can generate labeled data for an unlabeled dataset as well as generate new domains.
- Developing large-scale statistical independence test algorithms for genome-wide association studies (GWAS).

**Research Assistant, University of Technology Sydney, Australia** 08/2012 - 04/2017  
*Advisor: Prof Dacheng Tao and Prof Kun Zhang*

- Proved the identifiability of causal relation from the aggregated time series and proposed an approximate inference algorithm to discover causal relationship from aggregated data. **This is the first theory on the identifiability of causal relations from aggregated data.** (UAI'17)
- Proposed a coarse-fine neural network with multi-level supervisions for pose estimation. The proposed algorithm was the winner of several benchmark datasets. (ICCV'17)
- Proposed a novel domain adaptation algorithm with theoretical analysis to correct shift in joint distribution from a causal view. This is the first algorithm which is able to learn conditional invariant features in the presence of prior shift. (ICML'16)
- Proved the identifiability of causal relation from the subsampled time series and proposed an algorithm to discover causal relationship from subsampled data. **This is the first theory on identifiability of causal relations from subsampled data.** (ICML'15a)

- Improved Nonnegative Matrix Factorization (NMF) by incorporating large cone constraints and proposed an algorithm which obtained better local solutions. (TNNLS'17)

**Research Intern, Max Planck Institute for Intelligent Systems, Germany**

03/2013 - 10/2013

*Advisor: Dr Kun Zhang and Prof Bernhard Schölkopf*

- Analyzed different assumptions of multi-source domain adaptation in light of causal generative process. Proposed a practical multi-source domain adaptation algorithm to recover target-domain conditional distributions from the marginal distribution of features. (AAAI'15)
- Proved the identifiability of causal relations from time series with hidden components and proposed an algorithm to discover causal relations from such data. This is the first theoretical proof on the identifiability of causal relations from time series with hidden components. (ICML'15b)

**Exchange Student, Norwegian University of Science and Technology, Norway**

09/2010 - 01/2011

*Advisor: Prof Marius Pedersen*

- Conducted performance evaluation of image quality metrics and spatial pooling algorithms for color image quality assessment. (JVCI'12)

## PUBLICATIONS

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### Preprints

- [I3] Huan Fu\*, **Mingming Gong\***, Chaohui Wang, Kayhan Batmanghelich, Kun Zhang, and Dacheng Tao: Geometry-Consistent Adversarial Networks for One-Sided Unsupervised Domain Mapping. arXiv preprint arXiv:1809.05852 (2018).
- [I2] **Mingming Gong\***, Kun Zhang\*, Biwei Huang, Clark Glymour, Dacheng Tao, and Kayhan Batmanghelich: Causal Generative Domain Adaptation Networks. arXiv preprint arXiv:1804.04333 (2018).
- [I1] Xiyu Yu, Tongliang Liu, **Mingming Gong**, Kun Zhang, and Dacheng Tao: Transfer Learning with Label Noise. arXiv preprint arXiv:1707.09724 (2017).

### Conference

- [C15] Menghan Wang, **Mingming Gong**, Xiaolin Zheng, and Kun Zhang: Modeling Dynamic Missingness of Implicit Feedback for Recommendation. (Accepted to NIPS2018)
- [C14] Baosheng Yu, Tongliang Liu, **Mingming Gong**, Changxing Ding, Dacheng Tao: Correcting the Triplet Selection Bias for Triplet Loss. (Accepted to ECCV2018)
- [C13] Ya Li, Xinmei Tian, **Mingming Gong**, Yajing Liu, Tongliang Liu, Kun Zhang, Dacheng Tao: Deep Domain Generalization via Conditional Invariant Adversarial Networks. (Accepted to ECCV2018)
- [C12] Xiyu Yu, Tongliang Liu, **Mingming Gong**, Dacheng Tao: Learning with Biased Complementary Labels. (Accepted to ECCV2018, oral)
- [C11] Kun Zhang, **Mingming Gong**, Joseph Ramsey, Kayhan Batmanghelich, Peter Spirtes, Clark Glymour: Causal Discovery with Linear Non-Gaussian Models under Measurement Error: Structural Identifiability Results. (Accepted to UAI2018, plenary talk)
- [C10] Sumedha Singla, **Mingming Gong**, Siamak Ravanbakhsh, Barnabas Poczos, Kayhan Batmanghelich: Subject2Vec: Generative-Discriminative Approach from a Bag of Image Patches to a Vector. (Accepted to MICCAI2018)
- [C9] Huan Fu, **Mingming Gong**, Chaohui Wang, Kayhan Batmanghelich, Dacheng Tao: Deep Ordinal Regression Network for Monocular Depth Estimation. *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Salt Lake, Utah, USA, 2018.

- [C8] Xiyu Yu, Tongliang Liu, **Mingming Gong**, Kayhan Batmanghelich, Dacheng Tao: An Efficient and Provable Approach for Mixture Proportion Estimation Using Independence Assumption. *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, Salt Lake, Utah, USA, 2018.
- [C7] Ya Li, **Mingming Gong**, Xinmei Tian, Tongliang Liu, Dacheng Tao: Domain Generalization via Conditional Invariant Representations. *Proceedings of the 32nd AAAI Conference on Artificial Intelligence (AAAI)*, New Orleans, Louisiana, USA, 2018. (Oral)
- [C6] Shaoli Huang, **Mingming Gong**, Dacheng Tao: A Coarse-fine Network with Multi-level Supervision for Pose Estimation. *Proceedings of International Conference on Computer Vision (ICCV)*, Venice, Italy, 2017. (Spotlight)
- [C5] **Mingming Gong**, Kun Zhang, Bernhard Schölkopf, Clark Glymour, Dacheng Tao: Causal Discovery from Temporally Aggregated Time Series. *Proceedings of the 33rd Conference on Uncertainty in Artificial Intelligence (UAI)*, Sydney, AU, 2017.
- [C4] **Mingming Gong**, Kun Zhang, Tongliang Liu, Dacheng Tao, Clark Glymour, Bernhard Schölkopf: Domain Adaptation with Conditional Transferable Components. *Proceedings of the 33rd International Conference on Machine Learning (ICML)*, New York, USA, 2016. (Oral)
- [C3] Philipp Geiger, Kun Zhang, **Mingming Gong**, Bernhard Schölkopf, Dominik Janzing: Causal Inference by Identification of Vector Autoregressive Processes with Hidden Components. *Proceedings of the 32nd International Conference on Machine Learning (ICML)*, Lille, France, 2015. (Oral)
- [C2] **Mingming Gong\***, Kun Zhang\*, Bernhard Schölkopf, Dacheng Tao, Philipp Geiger: Discovering Temporal Causal Relations from Subsampled Data. *Proceedings of the 32nd International Conference on Machine Learning (ICML)*, Lille, France, 2015. (Oral)
- [C1] Kun Zhang, **Mingming Gong**, Bernhard Schölkopf: Multi-Source Domain Adaptation: A Causal View. *Proceedings of the 29th AAAI Conference on Artificial Intelligence (AAAI)*, Texas, USA, 2015.

## Journal

- [J7] Ruxin Wang, **Mingming Gong**, Dacheng Tao: Receptive Field Size vs. Model Depth for Single Image Super-resolution. (Accepted to IEEE Transactions on Image Processing (T-IP). Impact factor 5.071)
- [J6] Huan Fu, **Mingming Gong**, Chaohui Wang, Dacheng Tao: MoE-SPNet: A Mixture-of-Experts Scene Parsing Network. (Accepted to Pattern Recognition. Impact factor 3.39)
- [J5] Tongliang Liu, **Mingming Gong**, Dacheng Tao: Large Cone Non-negative Matrix Factorization. *IEEE Transactions on Neural Networks and Learning Systems (T-NNLS)* 28(9): 2129-2142. (Impact factor 6.108)
- [J4] Dawei Weng, Yunhong Wang, **Mingming Gong**, Dacheng Tao, Hui Wei, Di Huang: DERF: Distinctive Efficient Robust Features From the Biological Modeling of the P Ganglion Cells. *IEEE Transactions on Image Processing (T-IP)* 24(8): 2287-2302 (2015). (Impact factor 4.828)
- [J3] Xinge You, Qiang Li, Dacheng Tao, Weihua Ou, **Mingming Gong**: Local Metric Learning for Exemplar-Based Object Detection. *IEEE Transactions Circuits Systems Video Technology (T-CSVT)* 24(8): 1265-1276 (2014). (Impact factor 3.599)
- [J2] Xiubao Jiang, Xinge You, Yuan Yuan, **Mingming Gong**: A Method Using Long Digital Straight Segments for Fingerprint Recognition. *Neurocomputing* 77(1): 28-35 (2012). (Impact factor 3.317)
- [J1] **Mingming Gong**, Marius Pedersen: Spatial Pooling for Measuring Color Printing Quality Attributes. *J. Visual Communication and Image Representation (JVCI)* 23(5): 685-696 (2012). (Impact factor 2.164)

## STUDENT MENTORING

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Sumedha Singla (PhD, U Pitt) - “Learning Deep Representation for Predicting Disease Severity.”

Petar Stojanov (PhD, CMU) - “Nonparametric Approaches to Multi-source Domain Adaptation.”

Huan Fu (PhD, U Sydney) - “A Deep Exploration of Robust Dense Prediction for Visual Perception.”

Xiyu Yu (PhD, U Sydney) - “Learning with Label Noise and Distribution Shift.”

Ya Li (PhD, USTC) - “Conditional Invariant Feature Learning in Domain Generalization.”

Yanwu Xu (MEng, U Paris-East) - “Robust Losses for Local Descriptor Learning.”

## INVITED TALKS

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Talk on “Causal and Causally-inspired Learning”, School of Viterbi Engineering, University of Southern California, Los Angeles, USA, Aug 14, 2018

Talk on “Causal and Causally-inspired Learning”, Michelson Center for Convergent Bioscience, University of Southern California, Los Angeles, USA, Aug 13, 2018

Talk on “Causal Generative Domain Adaptation Networks”, School of Computer Science, National University of Defense Technology, Changsha, China, Jul 9, 2018

Talk on “Domain Adaptation from a Causal Perspective”, School of Electronic Information and Communications, Huazhong University of Science and Technology, Wuhan, China, July 4, 2018

Talk on “Discovering Causal Relations from Low-Resolution Time Series”, School of Computer Science, Wuhan University, China, July 3, 2018

Talk on “Deep Ordinal Regression Network for Monocular Depth Estimation”, CVPR Robust Vision Workshop, Salt Lake, USA, Jun 18, 2018

Talk on “Discovering Temporal Causal Relations from Subsampled Data”, Department of Biomedical Informatics, University of Pittsburgh, Pittsburgh, USA, May 5, 2017.

Talk on “Domain Adaptation with Conditional Transferable Components”, International Conference on Machine Learning (ICML) 2016, New York, USA, Jun 20, 2016.

Talk on “Causal Inference from Low-Resolution Time series”, School of Software, University of Technology Sydney, Australia, Sep 17, 2014.

Talk on “Recent Progress on Domain Adaptation”, Empirical Inference Department, Max Planck Institute for Intelligent Systems, Tübingen, Germany, Jun 19, 2013.

Talk on “Spatial Pooling for Image Quality Assessment”, Norwegian Colour and Visual Computing Laboratory, Norwegian University of Science and Technology, Gjøvik, Norway, Jan 19, 2011.

## AWARDS AND HONORS

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1st place in CVPR Robust Vision Challenge, 2018

Tencent Qrobot Application Development Contest, silver award, 2012

UTS President’s Scholarship, UTS, 2012 - 2016

Outstanding Research Paper Award, HUST, 2011

Postgraduate Studentship, HUST, 2009 - 2011

National Encouraging Scholarship of China, 2007

People Scholarship, NJU, 2005 - 2007

## ACADEMIC SERVICES

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### Conference program committee member of

- International Conference on Machine Learning (ICML), 2018
- Neural Information Processing Systems (NIPS), 2016 - 18

- Conference on Uncertainty in Artificial Intelligence (UAI), 2016 - 18
- International Conference on Artificial Intelligence and Statistics (AISTATS), 2016 - 19
- International Joint Conference on Artificial Intelligence (IJCAI), 2017 - 18
- AAAI Conference on Artificial Intelligence (AAAI), 2018, 2019 (**senior PC**)
- International Conference on Data Mining (ICDM), 2018
- UAI Causality Workshop: Learning, Inference, and Decision-Making, 2017
- The ACM SIGKDD Workshop on Causal Discovery, 2016 - 18

**Journal reviewer of**

- IEEE Transactions on Pattern Analysis and Machine Intelligence (T-PAMI)
- Artificial Intelligence (AI)
- IEEE Transactions on Neural Networks and Learning Systems (T-NNLS)
- IEEE Transactions on Image Processing (T-IP)
- IEEE Transactions on Cybernetics (T-CYB)
- IEEE Transactions on Big Data (T-BD)
- IEEE Transactions on Knowledge and Data Engineering (T-KDE)
- ACM Transactions on Knowledge Discovery from Data (T-KDD)
- ACM Transactions on Intelligent Systems and Technology (T-IST)
- Computer Vision and Image Understanding (CVIU)
- Pattern Recognition (PR)