Xin Du

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RESEARCH EXPERIENCE

POSTDOC Fellowship **2020-Now**

- **Trustworthy of Autonomous Systems.** Develop tools to regulate the robustness, safety, fairness and trustworthy of machine learning models for autonomous systems such as vehicles, financial agents, and medical robots.

PHD RESEARCH **2017-2020**

- **Fairness in Machine Learning**. Study fairness in terms of unsupervised sensitive subgroups. Propose a fairness measure for network representation model.
- **Conditional Average Treatment Effects.** Study the causal effect inference of individual treatments with observational data. Propose a covariate balancing technique to remove confounding bias from imbalanced data.
- **Local Causal Dependency.** Study the local causal dependency on the subgroup level. Propose a description-enhanced causal graph to explain the exceptional performance of a model on subgroups.
- **Exceptional Model Mining.** Study the exceptional multi-modal behavior on subgroups. Propose a Bayesian non-parametric model for the inference of exceptional behavior in terms of space, time, and texts.

RELEVANT RESEARCH SKILLS

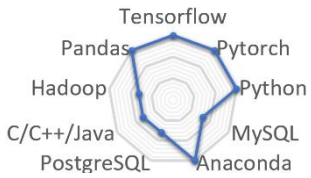
- **Probabilistic Methods.** Formulating problems, building statistical models, and making inference from data, using point estimate or Bayesian inference.
- **Latent Variable Methods.** Modeling generating process and inferring parameters considering the latent variables, using EM, MCMC and variational inference.
- **Hypothesis testing.** Formulating hypothesis testing with parametric/non-parametric assumptions. Validating the significance of deviations between two distributions.
- **Data mining.** Designing efficient data mining tools to discover interesting patterns from large scales datasets. I focus on multi-modal data like networks, spatio-temporal, texts and images.

- **Deep Learning Methods.** Building specific deep neural network structures to solve specific problems. The deep learning models that I mainly familiar are Transformers, Resnet, Variational Autoencoders, GANs, and Graph Convolutional Networks, please refer to my projects for specific applications of these models.
- **Causal Methods.** Employing domain knowledge to build causal graph for underlying generating mechanism. Using causal graph to regulate the model on tasks like counterfactual prediction, preventing the misleading of spurious associations.
- **Synthetic Analysis.** Designing synthetic data with specific generating process to validate methods.

ACADEMIC ACTIVITIES

- **Student Travel Award**, Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI), 2020.
- **(Senior) Program Committee Member**, ECML-PKDD 2020-2021, IJCAI 2021-2022, AAAI 2021-2022, UAI 2021-2022, AISTATS 2022.
- **Journal Reviewer**, International Journal of Artificial Intelligence in Education (IJAIED), Data Mining and Knowledge Discovery (DAMI).
- **Proceeding Chair**, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD), 2019.
- **Volunteer**, International Symposium on Intelligent Data Analysis (IDA), 2018.
- **Volunteer**, The Annual Machine Learning Conference of The Benelux (Benelearn), 2017.
- **Academic Visiting**, Helsinki University, Finland, 2019.
- **Researcher**, 3D modeling, Delft University of Technology, the Netherlands, 2015-2016.

ADDITIONAL SKILLS



EDUCATION

PhD Student in Computer Science, Eindhoven University of Technology, the Netherlands, 2017-2020.

Master`s Degree in GIS, Wuhan University, China, 2012-2015.

Bachelor`s Degree in GIS, Yunnan University, China, 2006-2010.

REFEREES

Prof. Dr. Mykola Pechenizkiy,

Dept. Mathematics and Computer Science,

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Dr. Wouter Duivesteijn,

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Prof. Dr. Subramanian Ramamoorthy,

Institute of Perception, Action and Behavior, School of Informatics,

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mailto:s.ramamoorthy@ed.ac.uk

Publications

[1] X. Du,

Uncertainty in Exceptional Model Mining. PhD thesis, 2020, https://research.tue.nl/en/publications/the-uncertainty-in-exceptional-model-mining

[2] X. Du, B. Legastelois, B. Ganesh, A. Rajan, H. Chockler, V. Belle, S. Anderson, S. Ramamoorthy,

Vision Checklist: Testable Error Analysis of Image Models to Help System Designers Interrogate Model Capabilities. Work-in-progress, 2022, https://arxiv.org/abs/2201.11674

[3] X. Du, S. Ramamoorthy, W. Duivesteijn, J. Tian, M. Pechenizkiy,

Beyond Discriminant Patterns: On the Robustness of Decision Rule Ensembles. arxiv preprint, 2021, https://arxiv.org/abs/2109.10432

[4] X. Du, Y. Pei, W. Duivesteijn, M. Pechenizkiy,

Exceptional Spatio-Temporal Behavior Mining through Bayesian Non-Parametric Modeling.

Data Mining and Knowledge Discovery (ECML-PKDD Journal Track), 2020, https://link.springer.com/article/10.1007/s10618-020-00674-z

[5] X. Du, Y. Pei, W. Duivesteijn, M. Pechenizkiy,

Fairness in Network Representation by Latent Structural Heterogeneity in Observational

Data. AAAI Conference on Artificial Intelligence (AAAI), 2020, https://ojs.aaai.org/index.php/AAAI/article/view/5792

[6] X. Du, L. Sun, W. Duivesteijn, A. Nikolaev and M. Pechenizkiy,

Adversarial Representation Learning for Causal Effect Inference with Observational

Data. Data Mining and Knowledge Discovery, 2021, https://link.springer.com/article/10.1007/s10618-021-00759-3

[7] X. Du, W. Duivesteijn, M. Klabbers, M. Pechenizkiy,

ELBA: Exceptional Learning Behavior Analysis.

Proceedings of the Eleventh International Conference on Educational Data Mining (EDM),

2018, https://eric.ed.gov/?id=ED593224

[8] W. Duivesteijn, S. Hess, X. Du,

How to Cheat the Page Limit.

WIREs Data Mining and Knowledge Discovery, 2020, https://wires.onlinelibrary.wiley.com/doi/full/10.1002/widm.1361

[9] Y. Pei, X. Du, J. Zhang, G. Fletcher, M. Pechenizkiy,

struc2gauss: Structure Preserving Network Embedding via Gaussian Embedding.

Data Mining and Knowledge Discovery, 2020, https://link.springer.com/article/10.1007/s10618-020-00684-x

[10] Y. Pei, X. Du, J. Zhang, G. Fletcher, M. Pechenizkiy,

Dynamic Network Representation Learning via Gaussian Embedding. Graph Representation Learning Workshop (NeurIPS), 2019.

[11] Y. Wang, V. Menkovski, H. Wang, X. Du, M. Pechenizkiy,

Causal Discovery from Incomplete Data: A Deep Learning Approach. arxiv preprint, 2020, https://arxiv.org/abs/2001.05343