Songgaojun Deng

sdeng4@stevens.edu | Github: amy-deng

Personal Statement

I completed my Doctor of Philosophy in Computer Science at Stevens Institute of Technology. My research interests have been **machine learning** and **data mining** motivated by real-world problems in social informatics and health informatics. My research have focused on developing deep graph learning models that capture spatio-temporal, dynamic and interpretable patterns.

Education

Stevens Institute of Technology — Hoboken, NJ
Ph.D. in Computer Science; GPA: 4.0/4.0 — *Aug 2018 - Aug 2022*

Advisor: Dr. Yue Ning

Relevant Coursework: Deep Learning, Machine Learning, Intro Text Mining/Nat. Lang Proc, Adv. Algorithm Dsgn & Implement

Thesis: Modeling and understanding societal events via graph neural networks

Beijing Institute of Technology — Beijing, China
Master of Engineering in Software Engineering; GPA: 4.0/4.0 — *Sep 2016 - May 2018*

Thesis: Evolutionary Neural Network Algorithm Based on Triplet Nucleotide Coding

China University of Mining and Technology — Xuzhou, China
Bachelor of Science in Electronic Information Science and Technology; GPA: 3.7/4.0 — *Sep 2012 - May 2016*

Experience

Yahoo Research — (remote) Sunnyvale, CA
Research Engineer Intern, Targeting Science Team — *June 2020 - Aug. 2020*

- **Applied Machine Learning**: Developed novel unsupervised clustering methods for cookieless ads targeting by studying the correlations between users' behaviors and appearances of their identities.

Institute of Electronics, Chinese Academy of Sciences — Suzhou, China
Research & Development Intern — *July 2015 - Mar 2016*

- **Distributed System**: Participated in distributed system testing, operation, and maintenance work.
- **Visualization**: Responsible for data visualization in social network data mining platform project and the real-time computing visualization platform project.

Publications

- **Deng, S.**, Rangwala, H. and Ning, Y., 2022, August. "Robust Event Forecasting with Spatiotemporal Confounder Learning". In Proceedings of the 28th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD).
- **Deng, S.**, Rangwala, H. and Ning, Y., 2021, November. "Understanding Event Predictions via Contextualized Multilevel Feature Learning". In Proceedings of the 21st ACM International Conference on Information and Knowledge Management (CIKM).
- **Deng, S.**, Wang, S., Rangwala, H., Wang, L. and Ning, Y., 2020, October. "Cola-GNN: Cross-location Attention based Graph Neural Networks for Long-term ILI Prediction". In Proceedings of the 20th ACM International Conference on Information and Knowledge Management (CIKM).
- **Deng, S.**, Rangwala, H. and Ning, Y., 2020, August. "Dynamic Knowledge Graph based Multi-Event Forecasting". In Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (pp. 1585-1595)
- **Deng, S.**, Rangwala, H. and Ning, Y., 2019, July. "Learning Dynamic Context Graphs for Predicting Social Events". In Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (pp. 1007-1016).
- Yang, X., **Deng, S.**, Ji, M., Zhao, J. and Zheng, W., 2018. "Neural Network Evolving Algorithm Based on the Triplet Codon Encoding Method". Genes, 9(12), p.626.
- Yang, X., Liu, G., **Deng, S.**, Wei, Z., He, H., Shang, Y. and Deng, N., 2019. "Exploration of a mechanism to form bionic, self-growing and self-organizing neural network". Artificial Intelligence Review, 52(1), pp.585-605.

Research Projects

- **Causality Enhanced Societal Event Forecasting With Heterogeneous Graph Learning**: (preprint) *2022*
  - Introduced a method to discover topics that have a causal effect on future events and proposed a causality-enhanced heterogeneous graph learning framework where topics, documents, and words are represented as nodes.
- **Robust Event Forecasting with Spatiotemporal Confounder Learning**: *2021*
  - Introduced a robust deep learning framework that includes individual treatment effect (ITE) estimation for event prediction.
- **Understanding Event Predictions via Contextualized Multilevel Feature Learning**: *2021*
  - Proposed a contextualized multilevel feature learning framework, for interpretable temporal event prediction.
- **Dynamic Knowledge Graph based Multi-Event Forecasting**: *2019*
  - Proposed a temporal graph learning method with heterogeneous data fusion for predicting concurrent events of multiple types and inferring multiple candidate actors simultaneously.
- **Forecasting Long-term Spatio-Temporal Epidemic Outbreaks**: *2019*
  - Studied a cross-location attention based graph neural network for learning multivariate time series embeddings and location aware attentions, which achieves the state-of-the-art prediction performance in long lead time settings (e.g. 15 weeks).
- **Learning Dynamic Context Graphs for Predicting Social Events**: *2018*
  - Presented a novel graph convolutional network for predicting future events. Designed a temporal encoding module to capture temporal dependencies and event context graphs.
- **Evolutionary Neural Network Algorithm Based on Triplet Nucleotide Coding**: (prior to my PhD studies) *2018*
  - Proposed a new evolutionary heuristic approach inspired by biological DNA genetic information and evolutionary mechanisms, which uses a triple nucleotide coding scheme to encode a neural network and a set of genetic operators to search for global optimal solutions.
- **Face Detection Using Multi-Task Convolutional Neural Networks**: (course project) *2017*
  - Implemented three Concatenated Convolutional Neural Networks (CNNs) to predict face and landmark locations in a coarse-to-fine manner.

Skills

- **Programming languages**: Python, SQL, C++, PHP, JavaScript, Scala
- **Libraries**: PyTorch, Keras, DGL, Scikit-Learn, NLTK, Numpy, Pandas

Additional Experience & Achievements

- 2022 Recipient of the Excellence in Graduate Research at Stevens.
- Received Stevens Excellence Doctoral Fellowship (2021-2022).
- Speaker of the tutorial *Explainable AI for Societal Event Predictions: Foundations, Methods, and Applications* at AAAI 2021.
- Departmental nomination for Microsoft PhD Fellowship 2021.
- Oral presentation of work *Cola-GNN: Cross-location Attention based Graph Neural Networks for Long-term ILI Prediction* at CIKM 2020.
- Oral presentation of work *Dynamic Knowledge Graph based Multi-Event Forecasting* at KDD 2020.
- Received KDD 2019 and 2020 student travel award.
- Received Women in Machine Learning (WiML @ NeurIPS 2019) travel grant.
- Oral presentation of work *Learning Dynamic Context Graphs for Predicting Social Events* at KDD 2019.
- Received travel grant to attend CRA Women in Computing Workshop 2019.

External Services

- **Student Reviewer/Subreviewer**: WWW, IEEE BigData, ICML, NeurIPS, ICLR, AAAI, IJCAI, KDD, SDM, PAKDD, WiML, ASONAM
- **Program Committee Member**: AAAI(2022,2023), CIKM(2022)
- **Journal Reviewer**: PeerJ, IEEE Transactions on Image Processing, Cybernetics and Systems, ACM TIST, Expert Systems with Applications