Junghoon Chae

Research Scientist
Computer Science and Mathematics Division
Oak Ridge National Laboratory

E-mail: chaej@ornl.gov/jchae21@gmail.com
Google Scholar: https://goo.gl/PVHCF7
Website: https://jchae21.github.io

EDUCATION

Purdue University, West Lafayette, IN — Dec. 2016
Ph.D. in Electrical and Computer Engineering
Thesis: Visual analytics of location-based social networks for decision support
Advisor: David S. Ebert

Purdue University, West Lafayette, IN — Jun. 2011
M.S. in Electrical and Computer Engineering
Advisor: David S. Ebert

Kyung Hee University, South Korea — Feb. 2008
B.S. in Computer Engineering and Electrical Engineering (Dual Major)

PROFESSIONAL EXPERIENCE

Oak Ridge National Laboratory — Jan. 2019 – Present
Staff Research Scientist
Visualization Group, Computer Science and Mathematics Division

Oak Ridge National Laboratory — Feb. 2017 – Dec. 2018
Postdoctoral Research Associate
Computational Data Analytics Group, Computer Science and Mathematics Division

Purdue University — Jun. 2009 – Dec. 2016
Research assistant
Visual Analytics for Command, Control, and Interoperability Environment, Department of Homeland Security's Center of Excellence in Visual and Data Analytics

Samsung Software Membership — Jan. 2005 – May 2007
Software Engineer (Intern)
Entitled to employment privilege to Samsung Electronics

Jiransoft Company — Feb. 2001 – Dec. 2004
Software Engineer in Security and Anti-Spam Lab (now Jiran security)
Military service exemption as skilled industrial personnel

RESEARCH INTEREST

Visual analytics and Human-computer interaction (HCI) for combining **human analytical capabilities** (e.g., visual processing and cognition) and **data analytics techniques** (e.g., machine learning and AI) for h**uman intelligence amplification**.

PUBLICATIONS

- My name is bold in all publications.
- Students or postdocs under my (co-)supervision are marked with an asterisk (*).
- My primary publication area is computer science, where conference papers are often considered equal to or of higher importance than journal publications.

Journal Article (peer-reviewed)

[j.8] J. Ugirumurera, J. Severino, K. Ficenec, Y. Ge, Q. Wang, L. Williams, **J. Chae**, M. Lunacek, and C. Phillips. A modeling framework for designing and evaluating curbside traffic management policies at Dallas-Fort Worth International Airport. *Transportation Research Part A: Policy and Practice.* 2021

[j.7] C. A. Steed, J. R. Goodall, **J. Chae**, A. Trofimov. CrossVis: A Visual Analytics System for Exploring Heterogeneous Multivariate Data with Applications to Materials and Climate Sciences. *Graphics and Visual Computing*, 2020

[j.6] M. Lorenz, S. T. King, N. Borodinov, C. A. Steed, **J. Chae**, A. V. Ievlev, O. S. Ovchinnikova. Co-Registered Application of Matrix Assisted Laser Desorption/Ionization Mass Spectrometry and Time-of-Flight Secondary Ion Mass Spectrometry Images for Visualizing Signaling Molecules. *Microscopy and Microanalysis*. 2019

[j.5] L. Tay, V. Ng, A. Malik, J. Zhang, **J. Chae**, D. S. Ebert, Y. Ding, J. Zhao, M. Kern. Big Data Visualizations in Organizational Science. *Organizational Research Methods*. 2017

[j.4] J. Zhang, A. Malik, **J. Chae**, Z. Min, S. Ko, D. Ebert. A Visual Analytics Framework for Microblog Data Analysis at Multiple Scales of Aggregation. *Computer Graphics Forum* (Proc. IEEE EuroVis 2016), 2016.

[j.3] S. Ko, I. Cho, S. Afzal, C. Yau, **J. Chae**, A. Malik, K. Beck, Y. Jang, W. Ribarsky, D. Ebert. A Survey on Visual Analysis Approaches for Financial Data. *Computer Graphics Forum* (Proc. IEEE EuroVis 2016), State-of-the-Art Reports (STARs), 2016

[j.2] **J. Chae**, D. Thom, Y. Jang, S. Kim, T. Ertl, D. Ebert. Public behavior response analysis in disaster events utilizing visual analytics of microblog data. *Computers & Graphics*, 38:51-60, 2014.

[j.1] C. Lee, **J. Chae**, T. Schap, D. Kerr, E. Delp, D. Ebert, C. Boushey. Comparison of Known Food Weights With Image-Based Portion Size Automated Estimation And Adolescents' Self-Reported Portion Size. *Journal of Diabetes Science and Technology*, 6(2), 2012.

Conference Papers (peer-reviewed)

[c.13] **J. Chae**, B. Park, M. Kim, E. Rush, O. Ozmen, M. Jones, M. Ward, J. Nebeker. CPViz: Visualizing Clinical Pathways Represented in Higher-Order Networks. *IS&T Electronic Imaging*, 2023 (To appear).

[c.12] S. Lim, **J. Chae**, G. Cong, D. Herrmannova, R. Patton, R. Kannan, T. Potok. Visual Understanding of COVID-19 Knowledge Graph for Predictive Analysis. *IEEE Big Data 2021 Workshop on Big Data Analytics for COVID-19*, 2021

[c.11] A. Bhardwaj*, **J. Chae**, R. Noeske*, J. R. Kim. TangibleData: Interactive Data Visualization with Mid-Air Haptics, *ACM Symposium on Virtual Reality Software and Technology (VRST)*. 2021

[c.10] M. Kim*, B. H. Park, O. Ozmen, E. Rush, **J. Chae**, M. M. Jones, R. W. Rupper, J. C. Humpherys, M. Ward, J. Nebeker. Data-Driven Inference of Clinical Pathway Components for Identifying Basic Care Patterns from Electronic Health Records. *The International Symposium on Bioinformatics Research and Applications (ISBRA)*. 2021

[c.9] S. Chinthavali, S. Lee, M. Starke, **J. Chae**, V. Tansakul, J. Munk, H. Zandi, T. Kuruganti, H. Buckberry, M. Bhandari and J. Leverette. Data Analysis Approach for Large Data Volumes in a Connected Community. *IEEE Power & Energy Society Innovative Smart Grid Technologies Conference (ISGT)*. 2021

[c.8] **J. Chae**, B. H. Park, M. Jones, M. Ward, J. Nebeker. Converting Clinical Pathways to BPM+ Standards: A Case Study in Stable Ischemic Heart Disease. *IEEE International Symposium on Computer-Based Medical Systems (CBMS)*. 2020

[c.7] **J. Chae**, D. Bhowmik, H. Ma, A. Ramanathan, C. Steed. Visual Analytics for Deep Embeddings of Large Scale Molecular Dynamics Simulations. *IEEE International Conference on Big Data (Big Data)*. 2019

[c.6] R. M. Patton, J. T. Johnston, S. R. Young, C. D. Schuman, T. E. Potok, D. C. Rose, S. Lim, **J. Chae**, L. Hou, S. Abousamra, D. Samaras, J. Saltz. Exascale Deep Learning to Accelerate Cancer Research. *IEEE International Conference on Big Data (Big Data)*. 2019

[c.5] **J. Chae**, C. Steed, J. Goodall, S. Hahn. Dynamic Color Mapping with a Multi-Scale Histogram: A Design Study with Physical Scientists. *Visualization and Data Analysis, IS&T Electronic Imaging*, 2019.

[c.4] **J. Chae**, J. Zhang, S. Ko, A. Malik, H. Connell, D. Ebert. Visual Analytics for Investigative Analysis of Hoax Distress Calls using Social Media. *IEEE International Conference on Technologies for Homeland Security*, 2016

[c.3] S. Ko, S. Afzal, S. Walton, Y. Yang, **J. Chae**, A. Malik, Y. Jang, M. Chen, D. Ebert. Analyzing high-dimensional multivariate network links with integrated anomaly detection, highlighting, and exploration. *IEEE Conference on Visual Analytics Science and Technology* (VAST), pp. 83-92, 2014.

[c.2] **J. Chae**, D. Thom, H. Bosch, Y. Jang, R. Maciejewski, D. Ebert, T. Ertl. Spatiotemporal Social Media Analytics for Abnormal Event Detection using Seasonal-Trend Decomposition. *IEEE Conference on Visual Analytics Science and Technology* (VAST), pp. 146-152, 2012.

[c.1] **J. Chae**, I. Woo, M. Zhu, S. Kim, R. Maciejewski, C. Boushey, E. Delp, D. Ebert. Volume Estimation Using Food Specific Shape Templates in Mobile Image-Based Dietary Assessment. *Computational Imaging IX, IS&T/SPIE Electronic Imaging*, pp. 78730K-78730K-8, 2011.

Workshop & Short Papers (peer-reviewed)

[s.7] **J Chae**, J. Kim, S. Lim. Position Papers for the ASCR Workshop on Visualization for Scientific Discovery, Decision-Making, and Communication. *ASCR Workshop on Visualization for Scientific Discovery Decision-Making, & Communication.* 2022

[s.6] **J. Chae**, C. D. Schuman, S. R. Young, J. T. Johnston, D. C. Rose, R. M. Patton, T. E. Potok. Visualization System for Evolutionary Neural Networks for Deep Learning. *International Workshop on Big Data Tools, Methods, and Use Cases for Innovative Scientific Discovery (BTSD) at IEEE Big Data.* 2019

[s.5] J. T. Johnston, S. R. Young, C. D. Schuman, **J. Chae**, D. D. March, R. M. Patton, T. E. Potok. Fine-Grained Exploitation of Mixed Precision for Faster CNN Training. IEEE/ACM Workshop on Machine Learning in High Performance Computing Environments (MLHPC) at Supercomuting (SC). 2019

[s.4] **J. Chae**, S. Gao, A. Ramanthan, C. Steed, G. D. Tourassi. Visualization for Classification in Deep Neural Networks. *Workshop on Visual Analytics for Deep Learning (VADL) at IEEE VIS*, 2017.

[s.3] J. Zhang, **J. Chae**, C. Surakitbanharn, D. S. Ebert. SMART: Social Media Analytics and Reporting Toolkit, *Workshop on Visualization in Practice at IEEE VIS*, 2017.

[s.2] **J. Chae**, Y. Cui, Y. Jang, G. Wang, A. Malik, D. Ebert. Trajectory-based Visual Analytics for Anomalous Human Movement Analysis using Social Media. *Eurovis Workshop on Visual Analytics*, 2015.

[s.1] **J. Chae**, D. Thom, Y. Jang, S. Kim, T. Ertl, D. Ebert. Visual Analytics of Microblog Data for Public Behavior Analysis in Disaster Events. *Eurovis Workshop on Visual Analytics*, 2013.

Extended Abstracts & Posters

[e.7] S. Lee, P. Devineni, S. Tennille, **J. Chae**, S. Chinthavali, B. Kay, H. Lu, V. Tansakul, A. Tabassum*. URBAN-NET: Predicting Propagation Consequences Using Synergistically Interacting Infrastructure Networks. *ORNL Software and Data Expo (OSDX)*, 2021

[e.6] M. Kim*, B. H. Park, O. Ozmen, E. Rush, **J. Chae**, M. M. Jones, R. W. Rupper, J. C. Humpherys, M. Ward, J. Nebeker. Data-Driven Inference of Clinical Pathway Components for Identifying Basic Treatment Patterns from Electronic Health Records, *IEEE-EMBS International Conference On Biomedical And Health Informatics (BHI'21)*. 2021

[e.5] S. Lee, P. Devineni, S. Tennille, **J. Chae**, S. Chinthavali, B. Kay, H. Lu, V. Tansakul, A. Tabassum*, URBAN-NET: Predicting Propagation Consequences Using Synergistically Interacting Infrastructure Networks, *ORNL Software and Data Expo (OSDX)*. 2021 (**Best Poster**)

[e.4] C. A. Steed, **J. Chae**, J. Goodall, S. Hahn. Improving Scientific Data Analysis Through Multi-touch Enabled Interactive Data Visualization with Applications to Neutron Science. *Workshop on Immersive Analytics at IEEE VIS*, 2017.

[e.3] **J. Chae**, G. Wang, B. Ahlbrand, M. B. Gorantla, J. Zhang, S. Chen, H. Xu, J. Zhao, W. Hatton, A. Malik, S. Ko, D. Ebert. Visual Analytics of Heterogeneous Data for Criminal Event Analysis. *IEEE*

Conference on Visual Analytics Science and Technology (VAST Challenge 2015 GC), pp. 149-150, 2015.

[e.2] W. Hatton*, J. Zhao, M. B. Gorantla, **J. Chae**, B. Ahlbrand, H. Xu, S. Chen, G. Wang, J. Zhang, A. Malik, S. Ko, D. Ebert. Visual analytics for detecting communication patterns. *IEEE Conference on Visual Analytics Science and Technology* (VAST Challenge 2015 MC2), pp. 137-138, 2015. (**Honorable Mention for Compelling Narrative Debrief**)

[e.1] J. Zhao, G. Wang, **J. Chae**, H. Xu, S. Chen, W. Hatton, S. Towers, M. B. Gorantla, B. Ahlbrand, J. Zhang, A. Malik, S. Ko, D. Ebert. ParkAnalyzer: Characterizing the movement patterns of visitors VAST 2015 Mini-Challenge 1. *IEEE Conference on Visual Analytics Science and Technology* (VAST Challenge 2015 MC1), pp. 179-180, 2015.

Book Chapters

[b.1] J. Zhang, **J. Chae**, S. Afzal, A. Malik, D. Thom, Y. Jang, T. Ertl, S. Matei, D. Ebert. Visual Analytics of User Influence and Location-Based Social Networks. In *Transparency in Social Media*, pp. 223-237. Springer International Publishing, 2015.

FUNDING PROFILE

Project Name: Visualization and data analytics for optimal process parameter selection for turning — 2021 – 2023
Sponsor: Department of Energy
Role: CO-PI
Funding Amount: $480,000

Project Name: Scalable graph kernel approach to describe differences between neural network models — 2021 – 2022
Sponsor: Oak Ridge National Laboratory
Role: Co-PI
Funding Amount: $190,000

Project Name: Intelligent Streaming Data and Event Analysis for Sensors (IDEAS) — 2019 – 2020
Sponsor: Oak Ridge National Laboratory
Role: CO-PI
Funding Amount: $1,034,000

Project Name: Advancing Domain Science with Explainable Deep-Learning: Application to High-Temperature Alloy Design — 2018
Sponsor: Oak Ridge National Laboratory
Role: CO-PI
Funding Amount: $600,000

Project Name: New Multi-modal Interactive Data Visualization Techniques for Scientific Data Analysis — 2017 – 2018
Sponsor: Oak Ridge National Laboratory
Role: CO-PI
Funding Amount: $190,000

INTELLECTUAL PROPERTY

Invention Disclosure

- Route Risk Profile Algorithm, Status: Awaiting Pre-Ranking
- System and method for machining parameter recommendation using in-process machining data aggregation, Status: Filed

Commercial Copyright

- Web application for machining parameter recommendation using visual analytics, Status: Granted by DOE
- Connected Neighborhood Data Analysis and Visualization Software, Status: Registered, 2022

AWARDS & HONORS

ORNL Inventor Awards 2022

Significant Event Award, ORNL 2019

Visual Analytics Science and Technology (VAST) Challenge 2015 2015
- Honorable Mention for Compelling Narrative Debrief

Frederic Miller Graduate Scholarship 2014 – 2015

PROFESSIONAL SERVICE

- **Guest Editor**: Journal of Autonomous Intelligence (eISSN: 2630-5046)
  - **Special Issue: Visual Analytics for Machine Learning** (2022)
- **Reviewer Board**: Journal of Big Data and Cognitive Computing (2020 – Present)
- **Program Committee**: IEEE PacificVis Visualization Notes (2017 – Present)
- **Reviewer**: Many Top tier visualization conferences and journals (IEEE TVCG, IEEE VIS, EuroVis, IEEE PacificVis)

TEACHING & MENTORING

Research Mentoring

- Ayush Bhardwaj (UT Dallas) Summer, 2021
  Interactive Data Visualization with Mid-Air Haptics
- Anika Tabassum (Virginia Tech)
  Energy Cost Savings through Optimization and Control of Appliances within Smart Neighborhood Homes
- Katherine Hausladen (Oak Ridge High School) Summer, 2019
  Data Visualization using Augmented-Reality
- Jian Ruan (Purdue University Undergraduate) Jun. 2015 – Aug. 2015
  Social Media Analytics and Reporting Toolkit: Forecasting movement with location-based social media data
- Yuchen Cui (Purdue University Undergraduates) May 2014 – May 2015
  Social Media Analytics and Reporting Toolkit: Abnormal movement detection and analysis with location-based social media data
- Jun Xiang Tee (Purdue University Undergraduate) May 2013 – Jun. 2014
  Web-based visual analytics for social media data

TECHNICAL SKILLS

Programming Languages
Proficient: Java, C/C++, JavaScript (D3.js, Three.js, JQuery), HTML, CSS
Familiar: Python, R, MATLAB

Programming Skills & Toolkits
Proficient: System Programming (UNIX/Linux, Windows)
Familiar: SQL, OpenGL

REFERENCES

David S. Ebert
Professor, University of Oklahoma
ebertd@purdue.edu

Niklas Elmqvist
Professor, University of Maryland, College Park
elm@umd.edu

Ross Maciejewski
Professor, Arizona State University
rmacieje@asu.edu

Yun Jang
Professor, Sejong University
jangy@sejong.edu