

# Junghoon Chae

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U.S. Permanent Resident

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## EDUCATION

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| <b>Purdue University</b> , West Lafayette, IN<br>Ph.D. in Electrical and Computer Engineering<br>Advisor: David S. Ebert | Dec. 2016 |
| <b>Purdue University</b> , West Lafayette, IN<br>M.S. in Electrical and Computer Engineering<br>Advisor: David S. Ebert  | Jun. 2011 |
| <b>Kyung Hee University</b> , South Korea<br>B.S. in Computer Engineering and Electrical Engineering (Dual Major)        | Feb. 2008 |

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## EXPERTISE

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- **Visualization of machine learning and deep neural network** for explaining and understanding them clearly
- **Visualization of real-world large-scale data** for decision making by integrating machine learning, statistical techniques, and human perception

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## PROFESSIONAL EXPERIENCE

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| <b>Oak Ridge National Laboratory</b><br>Postdoctoral Research Associate<br>Computational Data Analytics Group, Computer Science and Mathematics Division   | Feb. 2017 – Present   |
| <b>Purdue University</b><br>Research assistant<br>Visual Analytics for Command, Control, and Interoperability Environment, Department of Homeland Security's Center of Excellence in Visual and Data Analytics | Jun. 2009 – Dec. 2016 |
| <b>Samsung Software Membership</b><br>Software Engineer (Intern)<br>Entitled to employment privilege to Samsung Electronics  | Jan. 2005 – May 2007  |
| <b>Jiransoft Company</b><br>Software Engineer in Security and Anti-Spam Lab (now Jiransecurity)<br>Military service exemption as skilled industrial personnel  | Feb. 2001 – Dec. 2004 |

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## PUBLICATIONS

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### Journal Article (peer-reviewed)

- [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*. Advanced online publication: doi: 10.1177/1094428117720014, 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.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 (To Appear).
- [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.4] **J. Chae**, S. Gao, A. Ramanathan, 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.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.

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### AWARDS & HONORS

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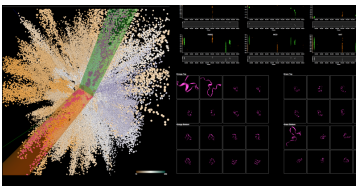
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| <b>Visual Analytics Science and Technology (VAST) Challenge 2015</b><br>Honorable Mention for Compelling Narrative Debrief | 2015        |
| <b>Frederic Miller Graduate Scholarship</b><br>\$6k for tuition and stipend for two semesters                              | 2014 – 2015 |

**GRANT**

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| Investigator, “Intelligent Streaming Data and Event Analysis for Sensors (IDEAS),” ORNL LDRD, \$1,034,000 (Lead PI: Schuman, Catherine D, Co-PIs: Patton, Robert M, Kaul, Brian C, Rose, Derek C, Young, Steven R, Theodore, Merlin)                 | 2019 – 2020 |
| Investigator, “Advancing Domain Science with Explainable Deep-Learning: Application to High-Temperature Alloy Design,” ORNL LDRD, \$600,000 (Lead PI: Sangkuun Lee, Co-PIs: Brady, Michael P, Yamamoto, Yukinori, Shin, Dongwon, Johnston, J Travis) | 2018        |
| Investigator, “New Multi-modal Interactive Data Visualization Techniques for Scientific Data Analysis,” ORNL Seed Project, \$190,000 (Lead PI: Chad Steed, Co-PIs: John Goodall and Steven Hahn, ORNL).  | 2017 – 2018 |

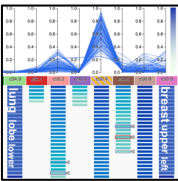
**SELECTED RESEARCH PROJECTS**

**Interactive Visualization for Interpretation of Embeddings (2018 – Present)**



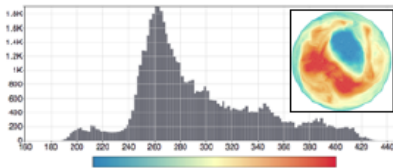
Visual analytics system for **analyzing embeddings** and helping users **understand their machine learning models**. The multiple coordinated views of the system enable users to explore different aspects of the data through different representations so that they find causal relationships easier and uncover unforeseen connections.

**Visualization for Classification in Deep Neural Networks (2017 – Present)**



Visual analytics system for Deep Neural Network (DNN) model. This web-based visualization system allows DNN developers to **understand and diagnose their DNN models** and suggests potential directions to improve their model.

**Dynamic Color Mapping with a Multi-Scale Histogram (2017 – 2018)**

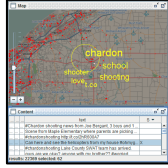


Interactive visualization techniques for **finding an optimal color mapping**. These techniques enable directly manipulating color mapping with simple mouse interactions and support multiple scales rather than one uniform scale which enables multiple resolutions.

**Visual Analytics of Micro Blogs for Public Behavior Analysis in Disaster Events (2014 – 2016)**



Visual analytics system of **spatiotemporal microblog data analysis** to improve emergency management, disaster preparedness, and evacuation planning. This visualization system analyzes temporal patterns of microblog data and provides a spatiotemporal visualization of microblog data.

**SMART: Social Media Analytics and Reporting Toolkit (2012 – 2016)**

Visual analytics system for providing users with **scalable and interactive social media data analysis and visualization** for exploration and examination of abnormal topics and events within various social media data sources, such as Twitter, Flickr, and YouTube.

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**TECHNICAL SKILLS**


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**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

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**PROFESSIONAL SERVICE**


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- **Program Committee:** IEEE PacificVis Visualization Notes (2017, 2019)
- **Reviewer:** IEEE VIS, HICSS, International Journal of Digital Earth (2018), IEEE Transactions on Big Data (2018), IEEE Transactions on Computational Social Systems (2018), Journal of the Association for Information Science and Technology (2018), Journal of Future Generation Computer Systems (2017), Georgia Sea Grant Proposal (2017)

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**TEACHING & MENTORING**


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**Research Mentoring**

- Jian Ruan (Purdue University undergraduates) 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