Zhenge Zhao

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Research Interests

- Interactive Visualization, Big Data Analysis, Machine Learning

Education

University of Arizona *Aug. 2016 – Dec. 2021*

- Ph.D. Degree in Computer Science
- Advisor: Dr. Carlos Eduardo Schedigger
- Thesis: "Techniques for Combining Visualization with Machine Learning in Data Analysis"

University of Illinois at Springfield *Sep. 2014 – Dec. 2015*

- Mater Degree in Computer Science
- Advisor: Dr. Ted Mims
- Graduate with Honors

Huazhong University of Science and Technology *Sep. 2009 – Jun. 2013*

- Bachelor of Engineering in Computer Science and Technology
- Advisor: Dr. Ling Yuan
- Graduation Thesis: "The Shortest Path Algorithm on a Road Network"

Working Experience

Epsilon Data Management, LLC *May 26,2022 – Present*

Decision Sciences

- Work as a Data Visualization Scientist & Full Stack Developer
- Responsible for researching and designing innovative full-stack visual analytics systems that reveal, explore and explain complex patterns and phenomena from Epsilon's petascale and massively-dimensional digital marketing ecosystem
- Research and design of innovative visual analytics systems that demonstrate the value of the Epsilon platform and that help clients to understand how their customers interact with them in complex digital marketing ecosystems.

Bosch Research *May 2019 – Aug. 2019*

Human Machine Interaction Department

- Worked as visualization and visual analytics research intern
- Conducted research in advanced visualization and visual analytics

Hanson Professional Services Inc. *Jun. 2015 – Aug. 2016*

Computer services department

- Regenerated the whole File Index Web pages in Visual Studio 2010 using ASP.NET Web Form
- Wrote the C# codes to achieve controls in background like looking up the database, role-based login
- Redesigned the stored procedure and triggers in MS Server for optimization and security problem

Rearch Experience

University of Arizona *Aug. 2016 – Dec. 2021*

The Humans, Data, and Computers lab

- **Human-in-the-loop Extraction of Interpretable Concepts in Deep Learning Models**: This is a collaboration project between HDC lab in UA and Bosch Research. We present a novel human-in-the-loop approach to generate user-defined concepts for model interpretation and diagnostics. Central to our proposal is active learning, where human knowledge and feedback are combined to train a concept extractor with minimal human labeling effort. We integrate this process into an interactive system, ConceptExtract.

• **STFT-LDA**: STFT-LDA is a novel technique to extract periodic and non-periodic features from time-series ensembles that combines short-time Fourier Transforms with topic modeling. Built a coordinated multiple-view prototype system based on STFT-LDA. Conducted a quantitative user study which shows that this technique can provide a better infrastructure for visual analysis of this specific type of time-series data.

• **Visualizing neuron activations of neural networks**: This project is trying to understand the neuron activations of deep neural networks in the training process. Built a comprehensive system which allows drilling down to confused inputs, pine-pointing the neuron when encountering errors and comparing different neural networks internally and externally.

University of Arizona *May. 2017 – Aug. 2017*

National Optical Astronomy Observatory and Computer Science Department

• **ANTARES**: The ArizonaNOAO Temporal Analysis and Response to Events System (ANTARES) is a software infrastructure necessary to process and filter alerts produced by Large Synoptic Survey Telescope. Built several important function modules to improve the scalability and robustness of the whole system. Optimized the dashboard to give detailed information of the system running results

University of Illinois at Springfield *Dec. 2014 – Jun. 2015*

Dr. Elham S. Khorasani's Group

• **Scalable fuzzy relational operations in MapReduce**: A novel MapReduce algorithm to scale-up the fuzzy relational operations to large-scale crisp datasets. Designed the load-balancing component for the fuzzy join. Implemented the program locally and on EMR. Wrote the Experiment and Summary sections, helped write the fuzzy Join algorithm.

• **Sequential course recommendation system**: This project utilizes a Markov chain collaborative filtering model to recommend courses to students at each semester based on the sequence of courses they have taken in the previous semesters. Designed the new collaborative filtering algorithm involving the parameter – time stamps, implemented the recommendation system using Mahout.

Publications

1. Zhenge Zhao, Panpan Xu, Carlos Scheidegger, and Liu Ren. Human-in-the-loop extraction of interpretable concepts in deep learning models. *IEEE Transactions on Visualization and Computer Graphics*, 28(1):780–790, 2022.

2. Zhenge Zhao, Danilo Motta, Matthew Berger, Joshua A Levine, Ismail B Kuzucu, Robert B Fleischman, Afonso Paiva, and Carlos Scheidegger. Stft-lda: An algorithm to facilitate the visual analysis of building seismic responses. *Information Visualization*, 20(4):263–282, 2021.

3. Mingwei Li, Zhenge Zhao, and Carlos Scheidegger. Visualizing neural networks with the grand tour. *Distill*, 2020. https://distill.pub/2020/grand-tour.

4. Thomas Matheson, Carl Stubens, Nicholas Wolf, Chien-Hsiu Lee, Gautham Narayan, Abhijit Saha, Adam Scott, Monika Soraisam, Adam S. Bolton, Benjamin Hauger, David R. Silva, John Kececioglu, Carlos Scheidegger, Richard Snodgrass, Patrick D. Aleo, Eric Evans-Jacquez, Navdeep Singh, Zhe Wang, Shuo Yang, and Zhenge Zhao. The ANTARES astronomical time-domain event broker. *The Astronomical Journal*, 161(3):107, feb 2021.

5. Gautham Narayan, Tayeb Zaidi, Monika D. Soraisam, Zhe Wang, Michelle Lochner, Thomas Matheson, Abhijit Saha, Shuo Yang, Zhenge Zhao, John Kececioglu, Carlos Scheidegger, Richard T. Snodgrass, Tim Axelrod, Tim Jenness, Robert S. Maier, Stephen T. Ridgway, Robert L. Seaman, Eric Michael Evans, Navdeep Singh, Clark Taylor, Jackson Toeniskoetter, Eric Welch, Songzhe Zhu, and The ANTARES Collaboration. Machine-learning-based brokers for real-time classification of the lsst alert stream. *The Astrophysical Journal Supplement Series*, 236(1):9, 2018.

6. Elham S. Khorasani, Matthew Cremeens, and Zhenge Zhao. Implementation of scalable fuzzy relational operations in mapreduce. *Soft Computing*, 22(9):3061–3075, May 2018.

7. E. S. Khorasani, Z. Zhenge, and J. Champaign. A markov chain collaborative filtering model for course enrollment recommendations. In *2016 IEEE International Conference on Big Data (Big Data)*, pages 3484–3490, Dec 2016.

Professional Skills

- **Programming**: Typescript, Python, JS, C++, C#
- **Web Design**: ReactJS, ASP.NET, HTLM, CSS3
- **Game Development**: Unity
- **Visualization**: D3,Open framework, ParaView
- **Data Analytics**: Hadoop, Hive, Pig, Mahout, Weka, R, Spark , SQL

Extracurricular Activities & Leadership

University of Arizona *Jan. 2018*

- Winner of two categories, Data Visualization and Best Use of AWS in Hack Arizona (about 1000 participants)

University of Illinois at Springfield *Aug. 2014 – Dec. 2015*

- Co-founder of UIS Tech Brainstorming Club
- Vice President of 404 Society
- Team Ranking $13th$ (129 teams) in the National Cyber League Championship Game
- Individual ranking $71st$ (2153 participants) in the National Cyber League Regular Game

Huazhong University of Science and Technology *Nov. 2011 – Nov. 2012*

- President of Oral Salon Association (Awarded as Top Ten Student Associations)
- Individual Awarded as Excellent Association Cadre during 2011-2012 academic year