

Sabrina Nusrat

Contact Information

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Education

- **Ph.D.** in Computer Science, University of Arizona, 2017
GPA: 4.00 in scale of 4.00, **Thesis:** Cartogram Visualization: Methods, Applications, and Effectiveness
- **MS** in Computer Science, University of Saskatchewan, Canada, 2012
- **BS** in Computer Science and Engineering, Bangladesh University of Engineering and Technology, 2009

Programming Languages and Tools

- Expert at: C/C++, Java, D3, SQL, ETL.
- Experienced in: JavaScript, ReactJS, R, shell script, Erlang.
- Familiar with: Python, Angular 4, OpenGL, ArcGIS, Tableau.

Major Software and Academic Projects

- **Bivariate Geographic Data Visualization with Cartograms**

<http://bivariate.weebly.com>

I designed and implemented a new visualization technique that allows for simultaneous visualization of two geo-statistical datasets (e.g., populations in two different years) in cartograms. Our evaluation of the proposed technique indicates bivariate cartograms are 4 times more effective than traditional approaches for finding geo-statistical patterns, trends, and outliers, and 74% participants prefer them.

- **Implementing and Evaluating Cartogram Algorithms**

<http://cartogram.cs.arizona.edu>

I implemented a software system with 10–12 algorithms for generating cartograms in Java, JavaScript and D3. Using our own python-based web application, we evaluated the effectiveness of 4 major cartogram types by quantitative performance analysis, and qualitative data, and compared these results with a performance metrics-based cartogram evaluation.

- **Visualizing the Internet Evolution**

<http://internetevolution.cs.arizona.edu/>

In this project I evaluated 4 geo-economical parameters (area, population, GDP and GDP per capita) of 195 countries, looking for clues of why some countries have a bigger Internet presence than others. We use correlation studies to analyze which geo-economical variable leads to bigger development in the Internet infrastructure per continent and per country, and cartograms to represent the growth of the Internet infrastructure around the world, in a sequence of 24 years. These visualizations lead to observations of patterns and outliers in such development.

- **Visualizing Real-time Positions of San Francisco's Buses and Trains**

<https://github.com/sabrinanusrat/sf-muni-visualization>

In this project, I use d3.js and Angular 4 to visualize the real-time positions of San Francisco's buses and trains (SF Muni). First, I use d3.js to display a base map of San Francisco from GeoJSON input files. Next, I draw SF Muni vehicle locations on top of the map, dynamically updating their locations every 15 seconds. Additionally, I provide a separate HTML control for selecting a subset of routes.

- **Inverse Parametric Optimization of Protein Sequence Alignment**

<http://inverseopt.cs.arizona.edu>

I implemented in C++ an algorithm for finding optimal parameters to fit a learning model for protein sequence alignment. This software takes a set of input protein sequences and their desired alignments as a training set, and using linear programming finds parameter values to find optimum protein sequence alignment for future inputs. In this project, I found and fixed software bugs and used efficient data structures and algorithms to reduce the running time to half so that the software becomes usable with real life data.

- **Recommending Services in a Decentralized User Modeling System**

I designed and simulated a trust-based decentralized recommender system that allows users in a social network to find a service provider (e.g., doctors) that best matches for them according to their preferences. Based on the feedback of the users, the the system then re-evaluates its recommendation model as well as its trust on its social network connections.

Experience

- August '13–May '17: Research and Teaching Assistant, University of Arizona
- May '15 – July '15: IT Application Developer Intern at Nationwide (Data Analytics)
- March '09 - July '10: Software Engineer in M&H Informatics (BD) Ltd. (An IMS Health Company)

Honors and Awards

- Invited participant to present Ph.D. thesis in Doctoral Colloquium, IEEE Vis, 2016
- Recipient of Fellowship for excellent performance in research, from Dept. of CS, U of Arizona, 2015
- Recipient of University of Arizona GPSC project grant for “Evaluating Cartogram Effectiveness”, 2015
- Invited participant in the CRA-Women Grad Cohort Workshop, 2014, 2015, and 2016
- Nominated for best graduate thesis, University of Saskatchewan, Canada, 2012
- Dean’s List Award, BUET, 2006

Selected Research Publications

1. Cartogram Visualization for Bivariate Geo-Statistical Data. *IEEE Transactions on Visualization and Computer Graphics*, 2017.
2. Evaluating Cartogram Effectiveness. *IEEE Transactions on Visualization and Computer Graphics*, 2016.
3. The State of the Art Report in Cartograms., *Computer Graphics Forum*, 35: 619 – 642, 2016.
4. Recognition and Recall of Geographic Data In Cartograms. *Manuscript submitted*, 2017.
5. Task Taxonomy for Cartograms., *17th IEEE Eurographics Conference on Visualization (EuroVis – short papers)*, 2015.
6. Analyzing the Evolution of the Internet., *17th IEEE Eurographics Conference on Visualization (EuroVis – short papers)*, 2015.
7. Simulating a Trust-based Service Recommender System for Decentralized User Modeling Environment., *Journal of Trust Management in Computing and Communications*, Vol. 1, No. 2, 2013.
8. Recommending Services in a Trust-Based Decentralized User Modeling System., *Trust, Reputation and User Modeling Workshop (TRUM)*, 2011.
9. Smallest and Some New Equiprojective Polyhedra., *11th International Conference on Computer & Information Technology (ICCIT)*, 2010.
10. A Study of Calorie Estimation in Pictures of Food. *Manuscript submitted*, 2017.