ADITI MALLAVARAPU

PhD Candidate
Learning Lab

Computer Science Department
University of Illinois at Chicago

RESEARCH INTERESTS

Analytics, Data Mining and Machine Learning applied to data from Educational Environments
Human-Computer Interaction
Learning in Open-ended Learning Environments and Complex System Environments
Computer Supported Collaborative Learning

PROFESSIONAL EXPERIENCE

May 2020-August 2020, Dec 2019 - Jan 2020, June 2019- Aug 2019	**Data Mining and Visualization Research Assistant,** New York Hall of Science, NY *Deploy data-collection scripts, data mining algorithms and web-based visualizations for visitor exhibit interaction data. Conduct participatory design sessions for designing facilitator data-driven analytics based dashboard to help visitor interactions in the museum.*
Aug 2016 – Present	**Teaching Assistant**, University of Illinois at Chicago, IL *Develop curriculum, designing labs and homework assignments, grading, conducting labs and instructing course materials.*
June 2018-Aug 2018	**Adjunct Professor,** University of Illinois at Chicago, IL *Single-handedly design curriculum and lead classes and labs for 30 high school seniors, to pique their interest in Computer Science through an introductory course of Discovering Computer Science for the summer semester.*
Jul 2017 – Aug 2017	**Research Assistant,** New York Hall of Science, NY *Solely responsible for deployment and implementation of python scripts to scrape live data, design dashboard visualizations, implement data mining routines for log-files and computer vision routines to analyze video data for a museum exhibit.*
Feb 2015 – Aug 2016	**Technical Consultant**, Perficient Inc, Chicago, IL *Responsible for design, development and testing of web application and integration projects using Object Oriented technologies such as Core Java, J2EE, JSP, JDBC, Java Beans, Web Services (REST/SOAP), XML, XSLT.*
Jun 2013 – Dec 2013	**Network Software Intern,** Tarana Wireless Inc., Santa Clara, CA *Designed applications to work with SNMP to get information from remote devices in python. Written test suites in python to test the working to various applications running on remote devices like ISS, SNMP etc.*
Aug 2011 – Jul 2012	**Programmer Analyst Trainee, Banking and Finance Sector,** Cognizant Technology Solutions, Pune, India *Designed an application for data analysis for very large databases (Frontend and Backend) Worked on a prediction tool OpenForecast to predict user interactions on the tool. Was a part of the team that designed a website for a client to send notifications about changes in data.*

TECHNICAL SKILLS

Programming Languages:	C, C++, Java , Python
Version Software:	Git (Version Software), SVN (Version Software)
Data Mining Libraries:	Scikit Learn (Sklearn Python Package), R, OpenPose, DoWhy (Causal Inference Python package), OpenCV
Social Network Analysis Libraries:	NetworkX (Python SNA package), Gephi
Scripting Languages:	Shell scripting, HTML , JavaScript, CSS, D3 JavaScript Library, React
Databases:	Oracle, MySQL, SQL, PL/SQL, MongoDB

Operating Systems: Linux, Windows, UNIX
Middleware: IBM Integration Bus 9.0, Axway 7.2

EDUCATION

Aug 2016 – Present **PhD** **Computer Science**
(Human-Computer Interaction, Learning Analytics, and Educational Data Mining Concentration)
Advisor: Dr. Leilah Lyons
University of Illinois at Chicago(UIC)
(Expected Graduation: May 2021)

Aug 2012 – Oct 2014 **MS** **Computer Science**
(Educational Data Mining Concentration)
University of Illinois at Chicago (UIC)
MS Thesis Title: *Developing Computational Methods to Measure and Track Learner's Spatial Reasoning*
Advisor: Dr. Leilah Lyons

Aug 2007 – May 2011 **BE** **Computer Engineering**
University of Pune, India

TEACHING EXPERIENCE

Jan 2018 – Present **Graduate Teaching Assistant**
Programming Design II (CS 141), Dr. Dale Reed
University of Illinois at Chicago, Chicago, IL
Lead four labs each week (Strength of class 20 in each Lab) and classes of introductory programming in C++ classes once a week for undergraduate students in Computer Science. Responsible for designing lab content and homework content, grading and developing course curriculum.

June 2018- Aug 2018 **Adjunct Professor**
Discovering Computer Science (CS 100)
University of Illinois at Chicago, UIC Chance, Chicago, IL
Single-handedly plan curriculum and lead classes and labs for 30 high school seniors for college credit, to pique their interest in Computer Science through an introductory course of Discovering Computer Science.

Jan 2018 – April 2018 **Instructor for Computer Science Elective**
Discovering Computer Science (CS 100)
University of Illinois at Chicago,
Saturday College UIC Chance, Chicago, IL
Single-handedly plan curriculum and lead classes (Strength of class 20) for Saturday College through UIC Chance Program for high-school students for introductory programming and Computer Science.

Jan 2017 – Dec 2017 **Graduate Teaching Assistant**
Discovering Computer Science (CS 100), Dr. Dale Reed
University of Illinois at Chicago, Chicago, IL
Lead four labs each week (Strength of class 20 in each Lab) and classes of introductory programming and computer science classes twice a week for undergraduate students in non- computer science majors. Responsible for designing lab content, grading and developing course curriculum.

Aug 2016 – Dec 2016 **Graduate Teaching Assistant**
Discrete Mathematics (CS 151), Dr. Bhaskar DasGupta
University of Illinois at Chicago, Chicago, IL
Lead two classes per week (strength of each class 30) for Discrete Mathematics for Undergraduates in Computer Science as major. Responsible for teaching, grading and giving homework assignments.

HONORS AND AWARDS

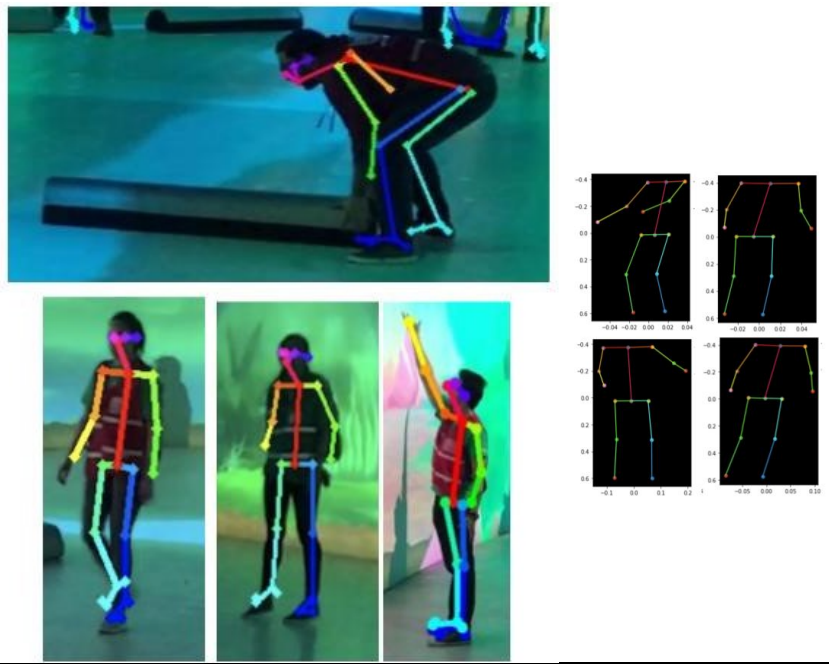
June 2019	Awarded the outstanding Teaching Assistant Award at Computer Science, UIC for 2018-2019
March 2019	Awarded the ACM SIGCHI student travel grant to attend the ACM SIGCHI 2019 in Glasgow, UK
Jan 2018	Awarded UIC Chance Program Scholarship, University of Illinois at Chicago, IL
Aug 2016-May 2017	Awarded the Peter and Deborah Wexler Graduate Student Award Scholarship, University of Illinois at Chicago, IL
Jun 2015	Conference paper selected to become journal article, International Conference of Educational Data Mining, Madrid, Spain June 25-30, 2015
Jun 2015	Awarded the Professor Ram Kumar Scholarship to attend the International Conference of Educational Data Mining Madrid, Spain.
Apr 2015	Awarded the Computer Research Association for Women (CRA-W) Travel Scholarship San Francisco, CA
Oct 2014	Awarded the Grace Hopper Celebration Scholarship for Grace Hopper Celebration Conference (GHC 2014), Phoenix, AZ.
Aug 2007- May 2011	Awarded Fee-waiver for excelling in performance consecutively for four years, University of Pune, India.

PROJECTS

Research Projects:

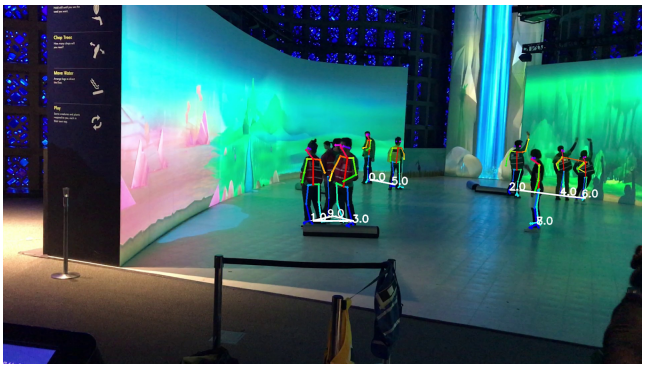
OpenPose and Clustering to Extract Action Poses from Video Data

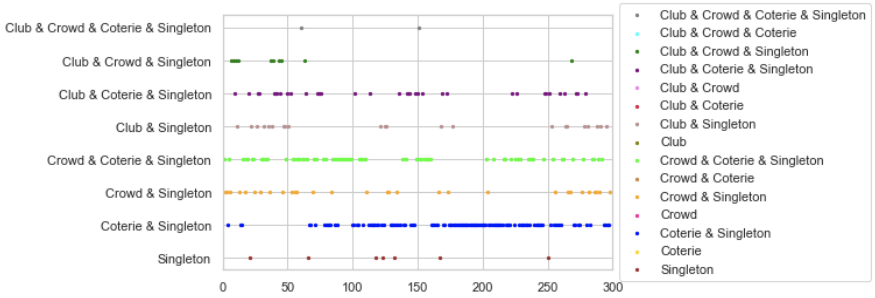
Collaboration often is studied in reference to the action contributions each individual in a group provides towards the collective task. Deciphering actions from video data, in the absence of think-aloud protocols and post-interviews can be very difficult, while also alluding researchers and educators from details of the contribution. We used OpenPose algorithm to detect skeletal postures of co-located museum visitors collaborating on a problem solving task, to assign action labels to understand contribution in the group task and also division of labor within the group.



Social Network Analysis for understanding Collaboration

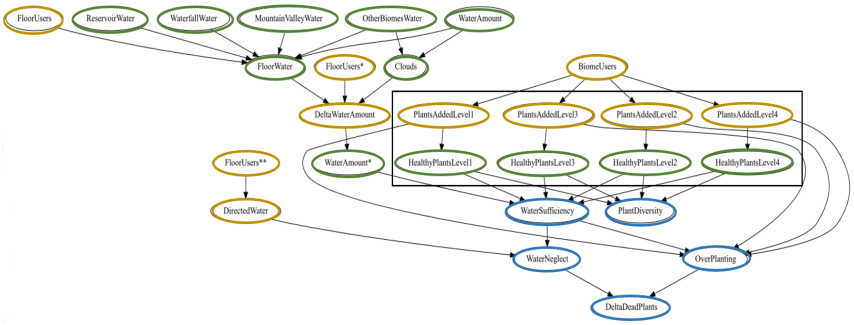
Constructed a low-cost, low-effort, ethical method to extract "collaboration temperature" from social structures in a co-located museum environment, captured through video data. For each frame network was constructed using the principles of proxemics, social network analysis was used to extract features of collaboration, which were then clustered using KMeans algorithm to decipher social structures. We term the combinations of these social structures as "collaborative temperature" which can be used to understand the collaborative state of the visitors' interactions in the exhibit. The "collaborative temperature" was used to understand the impact of an educational intervention.





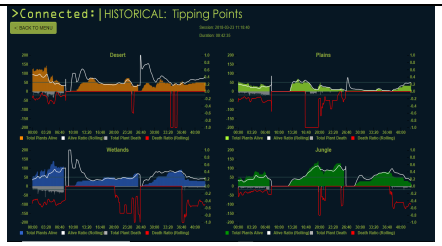
Causal Modeling for generating formative feedback

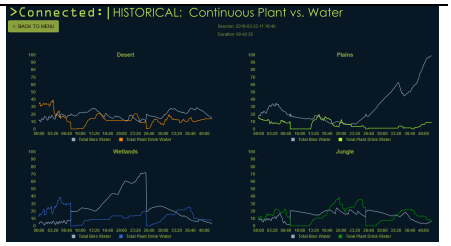
Constructed a causal graphical model of Connected Worlds museum exhibit to extract formative feedback for visitors using their interactions and systemic events triggered due to their collective actions. This involved constructing outcome metrics to evaluate the "state" of the complex-system environment, selecting the granularity and treatments applied to the visitor action nodes, and computing appropriate time lags to accurately understand the effect of visitors' interactions on the "outcomes".



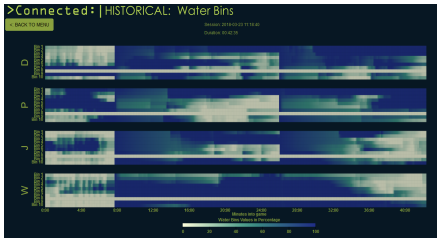
Connect-to-Connected Worlds

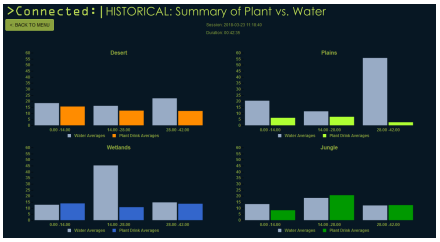
Created web-based tablet support for facilitators, researchers and visitors to the New York Hall of Science's Connected Worlds immersive simulation exhibit. This involved creating architecture to scrape live





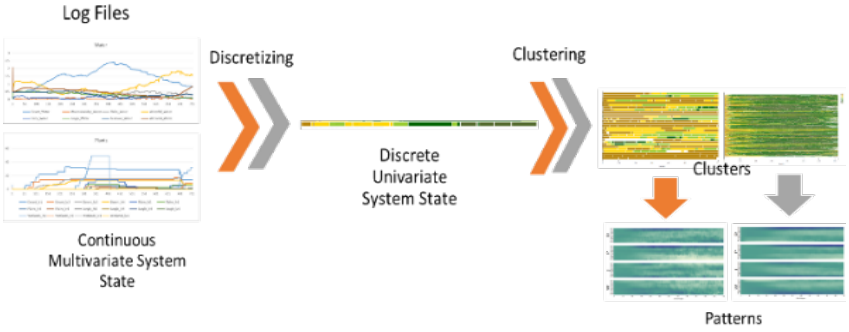
data from the exhibit while it is in use, deliver it to a database, and visualize the results in an on-demand fashion on tablets carried within the exhibit. These live, dynamic data visualizations can help visitors understand how their manipulations affect the simulated ecosystem's sustainability.





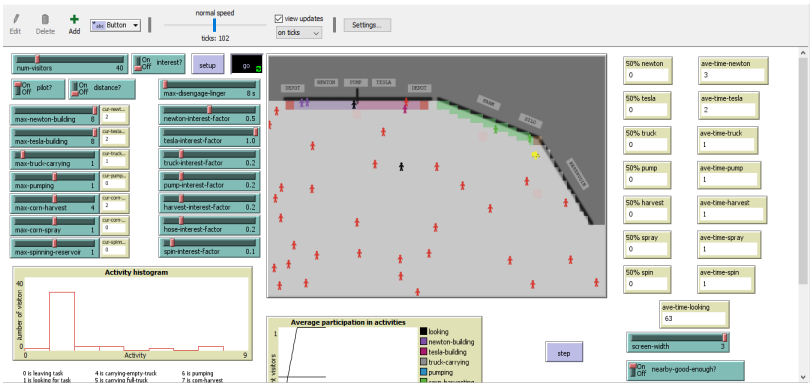
Mining Connected Worlds

Developed methods to analyze visitors' collective learning trajectories in Connected Worlds, an open-ended, collaborative ecosystem simulation exhibit. This was accomplished via data mining and developing custom visualizations. Results will be used to tune the simulation settings used to run the exhibit, to improve visitors' educational experience.



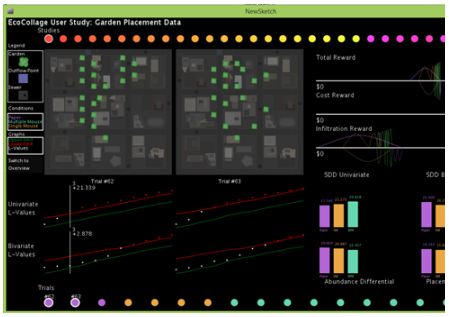
Modeling Connected Worlds

Created a data-driven model of how museum visitors moved around within and made use of a pilot version of the Connected Worlds exhibit. Used a complex system simulation tool (NetLogo) to model the layout and movement of visitors and the space, as informed by real-world measurements of visitor movements and engagement. Ran dozens of different permutations to understand which changes to the exhibit design could improve the collective usability of Connected Worlds.



Eco-Collage

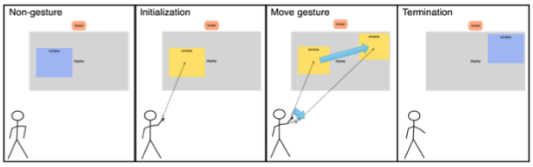
Designed metrics to evaluate and track the learners' spatial reasoning skills in an Urban planning-oriented game. Extensively used spatial metrics like Ripley's K and ecology metrics as a measure for spatial reasoning and applied regression to characterize the different spatial arrangements in terms of their infiltrations achieved as good and bad strategies. The results were used to examine if the user interface design affected the way in which learners approached exploring the problem space: did they use different spatial strategies, or discover them more quickly or more slowly, when using different user interfaces?



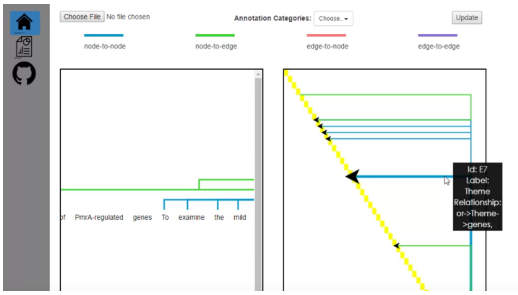
Academic Projects:

Connecting (Dis-) Connected Worlds: Empirical Analysis of Visitors Using Formative Data Visualizations in a Collaborative Mixed-Reality Simulation

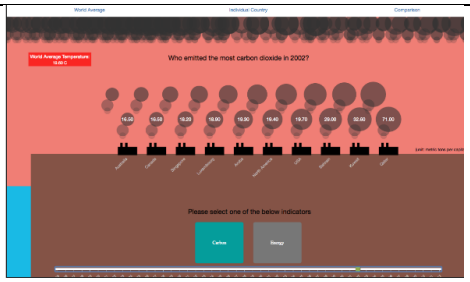
Analyzed Gesture Segmentation data using Skeleton Tracking and Machine Learning. (November 2016)

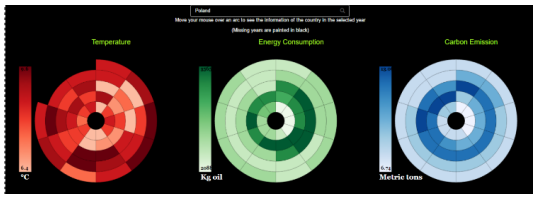


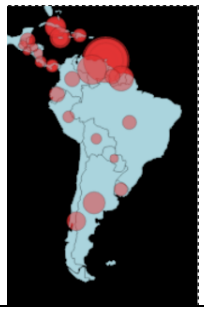
Designed a text annotation visualizer to annotate and analyze relationships among text elements within a sentence. (November 2016)



Designed a Visualization to monitor climate change across the world using D3 and javascript. (October 2016)







PUBLICATIONS

Conference

Mallavarapu, A., Lyons, L., Uzzo, S., Thompson, W., Levy-Cohen, R., & Slattery, B. (2019, April). Connect-to-Connected Worlds: Piloting a Mobile, Data-Driven Reflection Tool for an Open-Ended Simulation at a Museum. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (p. 7). ACM

Journals

Mallavarapu, A., Lyons, L., Slattery, B., Shelley, T., Minor, E., & Zellner, M. (2015) Developing Computational Methods to Measure and Track Learners' Spatial Reasoning in an Open-Ended Simulation. Journal of Educational Data Mining 7(2), 49-82.

Posters

Beheshti, E., Lyons, L., Thompson, W., **Mallavarapu, A.** & Uzzo, S. M. (2020, Apr 17 - 21) Human-in-the-Loop: Supporting Facilitators' Scaffolding of Visitor Engagement and Learning in Science Museums [Roundtable Session]. AERA Annual Meeting San Francisco, CA http://tinyurl.com/vl69qvq (Conference Canceled)

Beheshti, E., Lyons, L., **Mallavarapu, A.,** Wallingford, B., & Uzzo, S. (2020, April). Design Considerations for Data-Driven Dashboards: Supporting Facilitation Tasks for Open-Ended Learning. In Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems (pp. 1-9).

Under Review:

Journal

Mallavarapu, A., Lyons, L., Uzzo, S., (2020) Exploring the Utility of Social-Network-Derived *Collaborative Temperature* Readings for Informing Design and Research of Large-Group Immersive Learning Environments. In *Journal of Learning Analytics Special Issue: Collaboration Analytics.*

Lyons, L., **Mallavarapu, A.** (2020), Collective Usability: Using Simulation Tools to Explore Embodied Design Challenges in Immersive, Shared Mixed-Reality Experiences. Educational Technology & Society (Special Issue on Learning Experience Design: Embodiment, Gesture, and Interactivity in XR).

In Preparation

Journal

Lyons, L., **Mallavarapu, A.**, Connected Worlds: Evaluating the Collective Visitor Experience in a Large-Scale Multi-user Simulation Exhibit. International Journal of Human-Computer Studies.

Mallavarapu, A., Lyons, L., Uzzo, S. Analyzing Visitors' Collective Learning Trajectories in an Open-ended, Collaborative Ecosystem Simulation Exhibit. Journal of Learning Analytics.

Mallavarapu, A., Lyons, L., Behesheti, E., Walliingford, B.,Thompson, W., Uzzo, S., "We'll get there together": Fostering Agency in the Co-Design of a Data-Driven Dashboard, Journal of Learning Analytics (JLA).

Mallavarapu, A., Lyons, L., Zheleva, E., Uzzo, S., Causal Modeling of Open-Ended Learning Environments for Generating Formative Feedback. In *Journal of Learning Analytics*

Conference

Mallavarapu, A., Lyons, L., Uzzo, S., Interventions in Open-Ended Learning Environments effect and implications, Computer Human Interaction (CHI).

Mallavarapu, A., Lyons, L., Uzzo, S., Lag Sequential Analysis to understand the sequences of actions in Open-Ended Learning Environment, Computer Human Interaction (CHI).

COMMUNITY SERVICE

March 2020- Oct 2020	**Virtual Conference Chair,** MobileCHI 2020, Expanding the horizons of mobile interactions. Responsible for organizing the virtual platform and conference proceedings for about 500 attendees in collaboration with University of Oldenburg, Germany.
Jan 2020	**Reviewer**, CHI Conference on Human Factors in Computing Systems, 2020. Reviewed papers for the conference proceedings.
March 2018	**Judge**, 2018 CPS Exhibition of Student STEM Research Evaluate Science projects for high school students engaged in Engineering Projects

Jan 2017- Dec 2017	**Volunteer Mentor** for the Girls Who Code UIC division. Lead classes to teach mobile application development once a week (class strength 50) to middle school and high school girls. The students participated in a world-wide challenge showcasing their application.
Dec 2016	**Volunteer** for Hour of Code at the Skinner North Elementary School, IL Responsible for introducing concepts of basic Computer Science and guiding elementary grade students. Hour of Code is an outreach program to pique interests in Computer Science.
Aug 2015	**Volunteer**, Millet Project at University of California Berkeley, CA for Plant and Microbiology Department. Responsible for arranging the Project Exhibition, managing guests, and delivering information regarding the project.
Aug 2012-Present	**Member**, Women in Computer Science at UIC. Arranging and conducting Mentorship programs for Girls and Women like the Girls Who Code initiative.