

Anjali Singh

Curriculum Vitae

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Education

- 2019–Present **Ph.D. in Information**, *School of Information*,
University of Michigan.
- 2012–2017 **Integrated Master of Technology (Dual Degree)**, *Mathematics and Computing*,
Indian Institute of Technology, Delhi.

Prior Employment

- Jul'17–May'19 Research Software Engineer, IBM RESEARCH, Bangalore, India
- May'16–Jul'16 Intern, IBM SYSTEM DEVELOPMENT LABS, Bangalore, India
- May'15–Jul'15 Intern, DELOITTE CONSULTING, Gurgaon, India

Publications

- SIGCSE 2022 **Design Recommendations for Using Textual Aids in Data-Science Programming Courses**
Heeryung Choi, Caitlin Mills, Christopher Brooks, Stephen Doherty, **Anjali Singh**. To Appear in
Proceedings of the 53rd ACM Technical Symposium on Computer Science Education.
- L@S 2021 **What's In It for the Learners? Evidence from a Randomized Field Experiment on Learner-sourcing Questions in a MOOC**
Anjali Singh, Christopher Brooks, Yiwen Lin, Warren Li. Proceedings of the Eighth ACM Conference
on Learning@Scale. L@S, 2021.
Received Best Paper Award
- WWW 2019 **Adversarial Adaptation of Scene Graph Models for Understanding Civic Issues**
Shanu Kumar, Shubham Atreja, **Anjali Singh** and Mohit Jain. Proceedings of The Web Conference.
WWW, 2019.
- AAAI 2019 **Automatic Generation of Leveled Visual Assessments for Young Learners**
Anjali Singh, Ruhi Sharma Mittal, Shubham Atreja, Mourvi Sharma, Seema Nagar, Prasenjit Dey and
Mohit Jain. Proceedings of the AAAI Conference on Artificial Intelligence. Vol. 33. No. 01. pp.
9713-9720. 2019.
- IETE Technical Review 2018 **Unsupervised Graph-based Discourse Planning and Generation**
Anjali Singh and Niladri Chatterjee. IETE Technical Review (2018): 1-9.

Posters & Doctoral Consortium Papers

- ICER 2020 **Investigating the Benefits of Student Question Generation in Data Science MOOC Assessments**
Anjali Singh. Proceedings of the 2020 International Computing Education Research Conference. ICER,
2020.
- Educational Data Science 2020 **Understanding Students' Behavioral Patterns in Interactive E-books using Doc2vec Embeddings**
Poster presented at the AERA Satellite Conference on Educational Data Science, 2020
- ICTD X 2019 **Citicafe – An Interactive Interface for Enhancing Civic Engagement**
Demo presented at the tenth international conference on Information and Communication Technologies
and Development (ICTD), 2019.
- CODS-COMAD 2017 **Entity Extraction on Real Estate Twitter Data**
ACM India Joint International Conference on Data Science and Management of Data, 2017.

UIST 2015 **Investigating the “Wisdom of Crowds” at Scale**
Alok Shankar Mysore et al. Adjunct Proceedings of the 28th Annual ACM Symposium on User Interface Software & Technology.

Invited Talks

2021 **PROSE - Microsoft Research**
Feedback Generation for Introductory Data Science Programming Exercises

Awards and Fellowships

2021 **Best Paper Award**, *ACM Learning@Scale'21*.
2020 **Rackham Graduate Student Research Grant**, *University of Michigan*.
2014 **Summer Undergraduate Research Award**, *Indian Institute of Technology Delhi*.
2012 **Gold Medal, Indian Physics Olympiad (InPHO)**, *Indian Association of Physics Teachers*.
Awarded to Top 35 high school students in India on the basis of InPHO examination.

Skills

Research Methods	Data Manipulation, Machine Learning, A/B Tests, Statistical Methods, Surveys, Interviews
Programming	Python, R, SQL, MATLAB, HTML, C++, TensorFlow
Software	GitHub, L ^A T _E X, Linux command line

Academic Research Experience

Jan'20–Current **Research Assistant**, SCHOOL OF INFORMATION, University of Michigan.

- **Supporting Novice Learners in Data Science (DS) Programming**
 - Created taxonomy of novice data science learners' errors and misconceptions
 - Clustered student programs using neural embeddings of their Abstract Syntax Trees
 - Currently designing a human-AI collaborative tool to support instructors with feedback generation on novices' DS programming difficulties
- **Effects of Learnersourcing Questions on Data Science MOOC Learners**
 - Conducted a three armed experiment and surveys in a Data Science MOOC to understand how learners might help generate new instructional content and show greater depth of understanding of course material through *learnersourcing* (a pedagogically supported form of crowdsourcing)
 - Studied the impact of creating multiple choice questions when it is required vs when it is voluntary, on students' learning experience and quality of created questions
 - Led team of 10 to deploy the experiment and evaluate student generated questions
- **Understanding Students' Behavioral Patterns on E-books using Doc2vec Embeddings**
 - Modeled learners' behavioral patterns of learning from interactive ebooks using neural embeddings
 - Clustered embeddings to obtain 3 distinct groups of learners, demonstrating the value of using doc2vec embeddings to understand students' learning behavior

Industry Research Experience

Jul'17–May'19 **Research Engineer**, IBM RESEARCH, Bangalore, India.

- **Automatic Generation of Visual Multiple Choice Questions (MCQs) for Young Learners**
In collaboration with Sesame Workshop
 - Interviewed primary school teachers to understand assessment development process for young learners
 - Developed algorithm to curate multiple choice questions with images as options at multiple difficulty levels
 - Used information extraction and image captioning methods to measure image semantic similarity
- **Understanding Civic Issues from Images**
 - Interviewed citizens and civic authorities to understand usability of image, text, audio and video modalities for reporting civic issues
 - Mined large scale dataset of civic issue related scene-graphs for unsupervised adversarial training of deep learning model to annotate images with their civic issues
- **Extraction of Early Warning Signal (EWS) for Credit Risk from News Articles**
 - Built pipeline to extract EWS from unstructured news data and visualized EWS on a dashboard
 - Performed keyword extraction and sentiment mining for collating EWS from multiple data sources

Teaching Experience

- Sept'20–Apr'21 **Graduate Student Instructor**, *University of Michigan School of Information*.
- Led weekly labs for undergraduate level courses **Data Oriented Programming** and **Data Manipulation**
 - Conducted weekly office hours to answer students' questions and helped clear conceptual doubts
 - Created and evaluated programming assignments, course projects, and summative assessments
- May'20–Dec'20 **Teaching Assistant**, *University of Michigan and Coursera*.
- Developed and evaluated quizzes for the MOOC **Introduction to Data Science in Python** on Coursera
- Jul'16–May'17 **Teaching Assistant**, *Indian Institute of Technology Delhi*.
- Led weekly tutorials for courses **Analysis & Design of Algorithms** and **Probability & Stochastic Processes**
 - Created and evaluated exams and quizzes for a class of 100+ students

Service

- 2021 Mentored 2 teams in Educational Data Mining Track, **LearnLab, Carnegie Mellon University**
- 2021 Reviewer, **Computers & Education Journal**
- 2021 Reviewer, **Educational Data Mining Conference**
- 2020 Reviewer, **Learning Sciences Graduate Student Conference**

Master's Thesis

- Jul'16–Jun'17 **Discourse Planning and Generation from Structured Data**, *IIT Delhi*, Supervised by: Dr. Niladri Chatterjee.
- Proposed unsupervised graph-based algorithm for planning discourse elements.
 - Proved existence of Hamiltonian paths in various types of discourse graphs.
 - Developed discourse planning algorithm by finding Hamiltonian Path that maximizes the semantic similarity between consecutive nodes in a discourse graph.

Undergraduate Research Experience

- Feb'15–May'15 **Investigating the Wisdom of Crowds (WoC) at Scale**, *Aspiring Researcher Challenge, Stanford University and UC Santa Cruz*.
- Designed statistical experiments to answer critical questions about WoC effect such as best aggregation methods for crowd judgments and effect of social influence on human response
 - Formulated tasks on project website to crowdsource data and statistically compared WoC estimates against real metric values

Extra Curricular Activities

- 2018 Organising team member for **Hackathon on AI for Social Good** at IBM Research Labs India
- 2018 Mentored undergraduate student throughout her internship at IBM Research
- 2018 Volunteered at NGO Sparsha Trust for teaching children from underserved communities
- 2015–2016 Student Mentor for 6 freshman year students at IIT Delhi
- 2013–2017 Won several awards in national and institute level Dance Competitions at IIT Delhi