

KUNAL RELIA

Ph.D. Candidate - New York University

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EDUCATION

- Sep 2017 - Present **Ph.D., Computer Science**,
NYU Tandon School of Engineering, Brooklyn - USA.
Advisor: Julia Stoyanovich, Ph.D.
- Jan 2015 - Dec 2016 **M.S., Computer Science**,
NYU Tandon School of Engineering, Brooklyn - USA.
- Jul 2010 - Jun 2014 **B.E., Computer Engineering**,
Gujarat Technological University, Rajkot - India.

RESEARCH INTERESTS

Computational Social Choice, Responsible Data Science, Preference Data Management, Computational Social Sciences, Spatiotemporal Analysis.

PROFESSIONAL EXPERIENCE

Research Experience

- Jun 2016 - Present **Research Assistant**, *NYU Tandon School of Engineering, Brooklyn - USA.*
Research Projects: Diversity and Representation Constraints in Multiwinner Elections; Algorithmic Techniques for Necessary and Possible Winners; Discrimination in Social Media and Hate Crimes Across 100 U.S. Cities; Socio-Spatial Self-Organizing Map; Filling User Timeline Using Sparse Social Media Data; Predicting Demographics of Social Media Users

Non-research Experience

- Sep 2015 - May 2016 **Team Lead/Analyst**, *NYU Office of Graduate Admissions, Brooklyn - USA.*
Led a team of 21 graduate assistants; cut application processing time by 15%, and augmented a transcript evaluation algorithm
- Sep 2015 - Dec 2015 **Teaching Assistant**, *NYU Tandon School of Engineering, Brooklyn - USA.*
Assisted Prof. Viji Srinivasan (Computer Architecture 1) with coursework, assignments and exams, and tutored students excel in their concepts

- Jun 2010 - Jan 2015 **Co-founder and CEO, ReLife Pharma, Rajkot - India.**
Co-founded a health care start-up manufacturing and marketing medicines in India
- Unique marketing strategy of only targeting doctors in tier 3 cities was done as the customer base was untapped by any internationally licensed company
 - Manufactured medicines at World Health Organization - Good Manufacturing Practices (WHO-GMP) certified facilities to ensure best quality products; only 1 in 10 facility in India is awarded this certificate
 - Turned profitable from the first year itself managing sales in excess of \$150,000 (within top 7 percentile of Indian income)
- Jul 2013 - Jun 2014 **Software Developer Intern, Johnson & Johnson Ltd., Rajkot - India.**
Conceptualized and developed a claim management software capable of managing annual claims worth \$4.5M of company's 1000+ dealers
- Automated the claim generation and management process reducing the required human hours by 80%
 - Provisional patent for the concept has been filed at the Indian Patent Office

AWARDS

- Award **School of Engineering Fellowship - NYU Tandon, Sep 2017.**
Institutional fellowship awarded to select first year Ph.D. students
- Award **Graduate Scholarship - NYU Tandon, Jan 2015.**
Scholarship awarded to Master's students subject to renewal at the end of each semester based on the GPA
- Award **Academic Excellence Award - GTU, Jun 2014.**
An award for final-year students who show exemplary academic performance well in exams or practical implementation of computer science topics in the final year academic project

PUBLICATION

- 2020 **Kunal Relia** and Julia Stoyanovich. "*DiRe Committee: Diversity and Representation Constraints in Multiwinner Elections*" in-preparation.
- Vishal Chakraborty, Theo Delemazure, Benny Kimelfeld, Phokion Kolaitis, **Kunal Relia**, and Julia Stoyanovich. "*Algorithmic Techniques for Necessary and Possible Winners*." in-preparation (authors listed alphabetically).
- 2019 **Kunal Relia**, Zhengyi Li, Stephanie H Cook, and Rumi Chunara. "*Race, Ethnicity and National Origin-based Discrimination in Social Media and Hate Crimes Across 100 U.S. Cities*." Proceedings of the Thirteenth AAAI International Conference on Web and Social Media (ICWSM-2019).
Media: [Market Insider](#), [Business Insider](#), [The Register \(UK\)](#), [VICE](#), [The Philadelphia Inquirer](#)

- 2018 Nabeel Abdur Rehman, **Kunal Relia**, and Rumi Chunara. "*Creating Full Individual-level Location Timelines from Sparse Social Media Data*." ACM SIGSPATIAL GIS'18.

Kunal Relia, Mohammad Akbari, Dustin Duncan, and Rumi Chunara. "*Socio-spatial Self-organizing Maps: Using Social Media to Assess Relevant Geographies for Exposure to Social Processes*." Proceedings of the ACM on human-computer interaction 2, no. CSCW (2018).

Mohammad Akbari, **Kunal Relia**, Anas Elghafari, and Rumi Chunara. "*From the User to the Medium: Neural Profiling Across Web Communities*." Proceedings of the Twelfth AAAI International Conference on Web and Social Media (ICWSM-2018). (poster paper)

- 2017 Tom Huang, Anas Elghafari, **Kunal Relia**, and Rumi Chunara. "*High-resolution temporal representations of alcohol and tobacco behaviors from social media data*." Proceedings of the ACM on human-computer interaction 1, no. CSCW (2017).

MENTORING

- 2019 **Kennan Gumbs and Heeyun Kim**, *High-school students*.
Mentored students as part of NYU's Applied Research Innovations in Science and Engineering (ARISE) Program. This program gives academically motivated New York City high-school students, who are from historically under-represented groups in STEM (science, technology, engineering, and math), a chance to conduct research at one of NYU's STEM research labs.
- 2018 **Zhengyi Li**, *Undergraduate student*.
Mentored undergraduate student for two semesters as part of NYU's Undergraduate Research Program. This program provides undergraduate students, who wish to pursue careers in research, a hands-on experience of working in research labs.

TALKS

- 2017 **Natural Language Processing (NLP) Community Reception**, *NYU Center for Data Science, New York - USA*.

ACADEMIC COMMUNITY SERVICE

- Program Committee AAAI ICWSM (2020).
Reviewer ACM CHI (2020), ACM CSCW (2019, 2020).
Selection Committee NYU ARISE (2020).

NON-ACADEMIC COMMUNITY SERVICE

UNICEF.

Part of UNICEF's "Leadership Circle" and "Guardian Circle".

RESEARCH PROJECTS

Sep 2019 - Present **Diversity and Representation Constraints in Multiwinner Elections.**

In this work, we survey related work on computational social choice under diversity and representation constraints. We then go on to provide an algorithmic framework that selects a committee (i) using diversity constraints to lower bound the number of candidates selected across multiple candidate attributes, (ii) using representation constraints to lower bound the number of candidates selected from different voter subpopulations, and (iii) that has the maximal possible sum of scores of the selected candidates subject to meeting the diversity and representation constraints. Our framework provides the flexibility to select the voting rule to be used, and to specify the diversity and representation constraints. We analyze the computational complexity for selecting a committee using this framework, and provide hardness results for various multiwinner voting rules using different settings of diversity and representation constraints.

Jan 2019 - Present **Algorithmic Techniques for Necessary and Possible Winners.**

We investigate the practical aspects of computing the necessary and possible winners in elections over incomplete voter preferences. In the case of the necessary winners, we show how to implement and accelerate the polynomial-time algorithm of Xia and Conitzer. In the case of the possible winners, where the problem is NP-hard, we give a natural reduction to Integer Linear Programming (ILP) for all positional scoring rules and implement it in a leading commercial optimization solver. Further, we devise optimization techniques to minimize the number of ILP executions and, oftentimes, avoid them altogether. We conduct a thorough experimental study that includes the construction of a rich benchmark of election data based on both real and synthetic data. Our experimental findings suggest that, the worst-case intractability of the possible winners notwithstanding, the algorithmic techniques presented here scale well and can be used to compute the possible winners in realistic scenarios.

May 2018 - Jan 2019 **Discrimination in Social Media and Hate Crimes Across 100 U.S. Cities.**

We study malicious online content via a specific type of hate speech: race, ethnicity and national-origin based discrimination in social media, alongside hate crimes motivated by those characteristics, in 100 cities across the United States. We develop a spatially-diverse training dataset and classification pipeline to delineate targeted and self-narration of discrimination on social media, accounting for language across geographies. Controlling for census parameters, we find that the proportion of discrimination that is targeted is associated with the number of hate crimes. Finally, we explore the linguistic features of discrimination Tweets in relation to hate crimes by city, features used by users who Tweet different amounts of discrimination, and features of discrimination compared to non-discrimination Tweets. Findings from this spatial study can inform future studies of how discrimination in physical and virtual worlds vary by place, or how physical and virtual world discrimination may synergize.

Sep 2016 - Nov 2018 **Socio-Spatial Self-Organizing Map.**

Historically, neighborhoods have been defined using administrative boundaries like Zip codes. But, it is a growing understanding in social sciences that what we experience around us is different from what is captured by such administrative boundaries. Hence, we develop a novel pipeline, Socio-Spatial Self-Organizing Map (SS-SOM), that uses freely-available, sparse, geo-tagged social media data to assess relevant geographies to measure exposure to social processes. The pipeline uses (i) shallow neural network to classify Tweets, (ii) followed by dividing the city into grid-cells, and (iii) then using an augmented version of the Self-organizing Maps to create contiguous, non-overlapping, homogeneous clusters. We use prevalence of racism and homophobia in New York City as example social processes to measure the change in exposure to these social processes between Zip codes and SS-SOM clusters.

Sep 2016 - Oct 2018 **Filling User Timeline Using Sparse Social Media Data.**

A stochastic framework for predicting individual level mobility timelines using sparse location data from social media. The framework utilizes individual and community mobility patterns and prioritizes the effect of location data closer in time, to make predictions.

Jun 2016 - Dec 2016 **Predicting Age and Gender of Social Media Users.**

Demographic attributes like age and gender are considered important covariates in public health study. Moreover, while data from social media platforms like Twitter is increasingly used in public health research, companies' policy of not sharing users' demographic attributes act as a bottleneck in such analysis. Hence, we use the text of the Tweets made by users to infer their age using modern NLP techniques, and use user-names to infer the gender of the users.