

# Vijay Keswani

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## Education

- 2019-now **Ph.D. Candidate, Statistics and Data Science, Yale University, U.S.**
- 2017-2019 **Computer Science, EPFL, Lausanne, Switzerland.**
- 2015-2016 **Master in Technology, Computer Science and Engineering, IIT Kanpur, India.**
- 2011-2016 **Bachelor in Technology, Computer Science and Engineering, IIT Kanpur, India.**

## Experience

- 2022 **Resident Fellow, Information Society Project (ISP), Yale Law School, U.S.**
- 2022 **Policy Fellow, Yale Institute of Social and Policy Studies (ISPS), U.S.**
- 2021 & 2020 **Research Intern, Amazon AWS AI, Palo Alto, U.S.**
- 2016-2017 **Product Engineer, Sprinklr, Gurgaon, India.**
- 2014 **Research Intern, INRIA Paris-Rocquencourt and ENS, Paris, France.**
- 2013 **Research Intern, CSA Department, Indian Institute of Science, Bangalore, India.**

## Research

### Publications

- EAAMO 2022 **The Representation Pact - A Case Study in Computational Participatory Elections**, Florian Evéquo, Johan Rochel, Vijay Keswani, L. Elisa Celis.  
A novel participatory electoral process to select representative committees. Complemented by a case study of our implementation of this process in primary elections in Valais, Switzerland.
- ICML 2022 **A Convergent and Dimension-Independent Min-Max Optimization Algorithm**, Vijay Keswani, Oren Mangoubi, Sushant Sachdeva, Nisheeth K. Vishnoi.  
A feasible algorithm to find local equilibrium points for min-max optimization problems with applications for training Generative Adversarial Networks (GANs).
- BHCC 2021 **Designing human-in-the-loop approaches for closed deferral pipelines**, Vijay Keswani, Matthew Lease, Krishnaram Kenthapadi.  
A closed pipeline design to combine label elicitation and learning components of a decision-making framework with an option of deferring to human experts for contentious input data.
- KDD 2021 **Auditing for Diversity using Representative Examples**, Vijay Keswani, L. Elisa Celis.  
A cost-effective approach to approximate the disparity of any given unlabeled dataset, with respect to a protected attribute, using a small set of labeled representative examples.
- AIES 2021 **Towards Unbiased and Accurate Deferral to Multiple Experts**, Vijay Keswani, Matthew Lease, Krishnaram Kenthapadi.  
A framework to learn a classifier and a deferral model that defers to a domain expert in cases where the classifier has low confidence in its inference.
- ICML 2021 **Fair Classification with Noisy Protected Attributes: A Framework with Provable Guarantees**, L. Elisa Celis, Lingxiao Huang, Vijay Keswani, Nisheeth K. Vishnoi.  
An optimization framework for learning a fair classifier in the presence of noisy perturbations in the protected attributes that comes with provable guarantees on both accuracy and fairness.

- The Web Conf. 2021 **Dialect Diversity in Text Summarization on Twitter**, *Vijay Keswani, L. Elisa Celis*.  
Analysis of how standard text summarizations can under-represent certain dialects and application of a post-processing algorithm to generate dialect-diverse summaries for Twitter datasets.
- CSCW 2020 **Implicit Diversity in Image Summarization**, *L. Elisa Celis, Vijay Keswani*.  
A post-processing algorithm for fair image search and summarization that uses a small set of diverse examples to induce diversity in the generated image summary.
- ICML 2020 **Data preprocessing to mitigate bias: A maximum entropy based approach**, *L. Elisa Celis, Vijay Keswani, Nisheeth K. Vishnoi*.  
A pre-processing framework to mitigate biases that leverages the principle of maximum entropy.
- FAT\* 2019 **Classification with Fairness Constraints: A Meta-Algorithm with Provable Guarantees**, *L. Elisa Celis, Lingxiao Huang, Vijay Keswani and Nisheeth K. Vishnoi*.  
A meta-algorithm for fair classification takes the fairness type and constraint as input and returns a classifier which satisfies the fairness constraint at minimal cost to accuracy
- ICML 2018 **Fair and Diverse DPP-based Data Summarization**, *L. Elisa Celis, Vijay Keswani, Damian Straszak, Amit Deshpande, Tarun Kathuria, Nisheeth K. Vishnoi*.  
A simple linear-time approximate algorithm for fair summarization that samples from DPP (Determinantal Point Process) distributions with fairness constraints.
- IJCAI-ECAI 2018 **Balanced News Using Constrained Bandit-based Personalization**, *Sayash Kapoor, Vijay Keswani, Nisheeth K. Vishnoi, L. Elisa Celis*.  
A news-search prototype that de-polarizes the news feed by presenting balanced viewpoints across liberal and conservative articles.

### Working Papers

- 2022 **An Anti-subordination Approach to Fair Classification**, *Vijay Keswani, L. Elisa Celis*.  
We use the legal framework of anti-subordination to study the motivations of a fair classifier and its applications. Using this principle, we propose guidelines that a fair machine learning algorithm could follow to ensure an equitable and progressive impact on the affected population.
- 2022 **Fairness Constraints for Strategic Settings**, *Vijay Keswani, L. Elisa Celis*.  
In strategic settings, we show that fair classifiers do not address disparity in strategic manipulation cost across demographic groups. To address this, we propose a constrained optimization framework that constructs classifiers that lower the strategic manipulation cost for disadvantaged groups.

### Master's Thesis

- 2015-16 **Laplacian Solvers and Graph Sparsification**, *with Rajat Mittal, CSE, IIT Kanpur*.  
This thesis explored the scope of spectral sparsification algorithms used in Laplacian solvers and the relations between different state-of-the-art Laplacian solvers.

### Demos

- 2021-22 **Imaginaires**.  
Using the algorithm from our KDD 2021 paper on auditing using representative samples, we developed a Firefox plugin, called Imaginaires, that can efficiently and accurately quantify the extent of representational biases in Google Image Search results.
- 2019 **Application of the Fair Multiwinner Elections framework**.  
Helped employ the framework for Fair Multiwinner Elections for the primary elections of Appel Citoyen in the region of Valais, Switzerland.
- 2018 **Balanced News demo**.  
We develop a demo to demonstrate what a balanced content delivery engine would look like, comparing our news content delivery (balanced news) with existing approaches (unfiltered news).