IDEAL

The Institute for Data, Econometrics, Algorithms, and Learning

Northwestern McCORMICK SCHOOL OF ENGINEERING

TOYOTA TECHNOLOGICAL INSTITUTE AT CHICAGO

THE UNIVERSITY OF CHICAGO

Senior Personnel

	CS	Stats	Econ	OR	EE
TTIC					
UofC				 	
NU	   		  		 

Co-directors: Jason Hartline and Aravindan Vijayaraghavan

IDEAL Postdoctoral Fellows

Ali Vakilian

- PhD from MIT (CS) in 2019.
- Postdoc at Wisconsin-Madison in 2019-20.
- *Research interests:* Algorithms for massive data, Learning based (aka data driven) algorithms and Algorithmic fairness.

Jishuo Dong

- PhD from UPenn (Applied math) in 2020.
- *Research interests:* Privacy-preserving statistics and machine learning, Game theory and mechanism design and Optimization.

Our Sponsors

IDEAL is a HDR TRIPODS institute supported by the National Science Foundation under award CCF 1934931.

IDEAL is an NSF HDR TRIPODS Phase I Institute

Transdisciplinary **R**esearch **I**n **P**rinciples **O**f **D**ata **S**cience

Research foci:

- High dimensional data analysis
- Data science in strategic environments
- Machine learning and optimization

Problem: enable collaborations across disciplines and local universities.

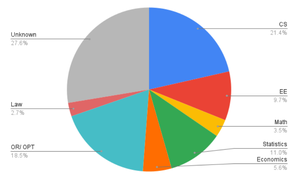
Approach: focused coordination in special quarters graduate course work, visiting predoctoral fellows, workshops (half day), and external virtual visitors.

Special Quarters:

- Spring 2020: Inference and Data Science on Networks
- Fall 2020: Theory of Deep Learning
- Spring 2021: Data Science and Law
- Fall 2021: Robustness in High-dimensional Statistics
- Spring 2022: High Dimensional Data Analysis
- Fall 2022: Data Economics

NATIONWIDE PARTICIPATION

Special Quarter Topic	Total	Internal (IDEAL)	External	Outside US
Spring 2020 Network Inference	87	66	21	7
Fall 2020 Deep Learning	276	152	124	44
Spring 2021 Data Science + Law	125	21	104	14
Fall 2021 Robustness	128	59	69	13
Averages	154.0	48.4%	51.6%	12.66%



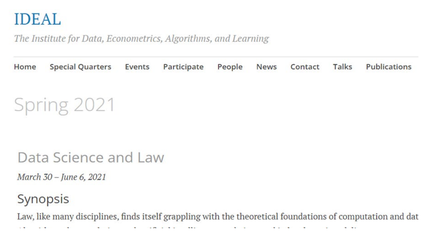
- Workshops drew participation from outside Chicago (51.6%) and internationally (12.66%).
- Many hybrid courses with wide participation
- 81 (out of 153) external students taking courses in Fall quarter on deep learning.
- Course on robustness was hybrid, 51 external students accessed class recordings

LEADING NEW INTERDISCIPLINARY AREAS

+

New intersection at the interface of Law with Data Science and CS.

- Ongoing virtual ***Monthly CS+Law Series*** led by Dan Linna and Jason Hartline
- Involving *206 faculty and students* from schools like MIT, Berkeley, Stanford, UPenn, UCLA, Cornell, Boston U etc.
- National Participation and Impact.


IDEAL
The Institute for Data, Econometrics, Algorithms, and Learning

Home Special Quarters Events Participate People News Contact Talks Publications

Spring 2021

Data Science and Law

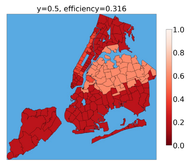
March 30 – June 6, 2021

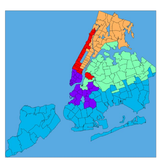
Synopsis

Law, like many disciplines, finds itself grappling with the theoretical foundations of computation and dat

RESEARCH HIGHLIGHTS

- Research by team member Candogan (UC) and NU PhD student Feng concerned controlling epidemic spread and reducing economic losses via interventions. It received media coverage from outlets such as the New York Times, the Associated Press, etc.





The New York Times

Coronavirus Shutdowns: Economists Look for Better Answers

Researchers are developing models for more targeted closings (and reopenings) that would curb the spread of infection at a less severe economic cost.

- IDEAL Postdoc Vakilian and coPI Y.Makarychev designed new algorithms for socially fair clustering and its variants, which significantly improved upon the state-of-the-art guarantees. These works were published in COLT 2021 and SODA 2022.
- CoPI Vijayaraghavan, team member Awasthi and PhD student Tang gave polynomial time algorithms for learning depth-2 neural networks with general ReLU activations under mild non-degeneracy assumptions. This was published in NeurIPS 2022.
- The project supported two postdoctoral researchers (Dong, Vakilian), at least 10 PhD students and 2 undergrads through an REU supplement.

Presenter: Varun Gupta (Co-PI, University of Chicago)