Arthur Cohen Lecture
Conformal Prediction in 2022

Emmanuel Candès, Stanford University

Wednesday, April 20, 2022
4:00 PM – 5:20 PM
Reception: 5:20-6:00pm

Fiber Optics Material Research Building, Auditorium

Abstract: Recent progress in machine learning provides us with many potentially effective tools to learn from datasets of ever-increasing sizes and make useful predictions. How do we know that these tools can be trusted in critical and highly-sensitive domains? If a learning algorithm predicts the GPA of a prospective college applicant, what guarantees do we have concerning the accuracy of this prediction? How do we know that it is not biased against certain groups of applicants? To address questions of this kind, this talk reviews a wonderful field of research known under the name of conformal inference/prediction, pioneered by Vladimir Vovk and his colleagues 20 years ago. After reviewing some of the basic ideas underlying distribution-free predictive inference, we shall survey recent progress in the field touching upon several issues: (1) efficiency: how can we provide tighter predictions? (2) data-reuse: what do we do when data is scarce? (3) causal inference: can we predict the counterfactual response to a treatment given that the patient was not treated? (4) what guarantees can we possibly have when we suspect that the data is not exchangeable? and (5) algorithmic fairness (if time allows): how do we make sure that learned models apply to individuals in an equitable manner?

Bio: Emmanuel Candès is the Barnum-Simons Chair in Mathematics and Statistics at Stanford University. His research interests lie at the interface of mathematics, statistics, information theory, signal processing and scientific computing. He received his Ph.D. in statistics from Stanford University in 1998. Candès has received countless awards including the Alan T. Waterman Award from NSF, which is the highest honor bestowed by NSF to early-career scientists, and the MacArthur Fellowship, popularly known as the 'genius award'. He has given over 60 plenary lectures at major international conferences, not only in mathematics and statistics but in many other areas as well including biomedical imaging and solid-state physics. He was elected to the National Academy of Sciences and to the American Academy of Arts and Sciences in 2014.
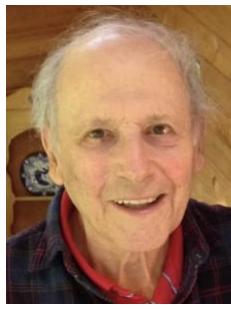
Arthur Cohen (1933-2021) was a brilliant applied and mathematical statistician and a wonderful colleague and leader of Department of Statistics at Rutgers. He spent his career at Rutgers from 1963, and served as the department chair for many years. A world-renowned leader in decision theory, he was known in the research world for blending dynamic applied statistical expertise with rigorous and creative mathematical skills. Among other distinctions, Cohen was honored as a Fellow of the Institute of Mathematical Statistics, the American Statistical Association, and the International Statistical Institute. He served as Editor of the Annals of Statistics, and Co-Editor of the Journal of Multivariate Analysis. Among his colleagues he was also revered for his integrity, geniality, incisiveness, and an unending passion for statistics.

The Department of Statistics at Rutgers University established an Arthur Cohen Lecture, in Arthur's honor, as one of the major annual events of the department.

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