Cynthia Dwork: A Brief Intellectual Biography

Cynthia Dwork, Gordon McKay Professor of Computer Science at the John A. Paulson School of Engineering and Applied Sciences at Harvard, and Affiliated Faculty at the Harvard Law School and the Department of Statistics, is renowned for placing privacy-preserving data analysis on a mathematically rigorous foundation. A cornerstone of this work is Differential Privacy, a strong privacy guarantee permitting sophisticated data analysis. Differential Privacy is widely deployed in industry, including in every Apple device, and is the backbone of the Disclosure Avoidance System for the 2020 US Decennial Census.

Dwork joined Harvard after more than thirty years in industrial research at IBM and Microsoft. Some of her earliest work established the pillars on which every fault-tolerant distributed system has been built for decades.Her innovations modernized cryptography to cope with the ungoverned interactions of the internet through the development of non-malleable cryptography; provided a proof-of-concept for the post-quantum era with the first lattice-based public-key cryptosystem, which also was the first to enjoy worst-case/average-case equivalence; fought email spam and formed the basis of crypto-currencies through proofs of work; and gave the first general approach to ensuring statistical validity in exploratory data analysis, via a connection to differential privacy. In 2012 she launched the theoretical investigation of algorithmic fairness, a topic experiencing explosive growth and the driving force behind the multidisciplinary Hire Aspirations Institute devoted to fairness in hiring platforms.

Dwork is a member of the US National Academy of Sciences, the US National Academy of Engineering, and the American Philosophical Society, and a Fellow of the American Academy of Arts and Sciences and of the ACM. Her awards include the Gödel Prize, the ACM-IEEE Knuth Prize, the ACM Paris Kanellakis Theory and Practice Award, the RSA Mathematics Award, the IEEE Hamming Medal, and test-of-time recognition in four fields.