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Protecting Patient Privacy in Genomic Analysis

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Patient genomes are interpretable only in the context of other genomes. However, privacy concerns over genetic data oftentimes deter individuals from contributing their genomes to scientific studies and prevent researchers from sharing their data with the scientific community. In this talk, I will describe how we can leverage secure multiparty computation techniques from modern cryptography to perform useful scientific computations on genomic data while protecting the privacy of the participants' genomes. In multiple real scenarios, our methods successfully identified the disease-causing genes and even discovered previously unrecognized disease genes, all while keeping nearly all of the participants' most sensitive genomic information private. We believe that our techniques will help make currently restricted data more readily available to the scientific community and enable individuals to contribute their genomes to a study without compromising their personal privacy.

The material from this talk is based on joint works with Gill Bejerano, Bonnie Berger, Johannes A. Birgmeier, Dan Boneh, Hyunghoon Cho, and Karthik A. Jagadeesh.

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