Abstract: The unprecedented advances in our ability to acquire and process diverse types of data, and the resulting emergence of “big data” offers unprecedented opportunities for accelerating discoveries in biomedical and health sciences. They also drive fundamental methodological advances in artificial intelligence in general, and machine learning and causal inference in particular. I will describe several examples, drawn from research in my lab, of successful applications of artificial intelligence yielding new tools for biomedical research, e.g., for characterizing and predicting biomolecular interactions and complexes, identifying metagenomic biomarkers of inflammatory bowel disease, elucidating brain activity biomarkers of age-related cognitive declines, and predicting cancer survival. I will provide some examples of methodological advances in machine learning, e.g., federated machine learning algorithms for settings where access constraints prevent centralized access to data, algorithms for predictive modeling from ultra high dimensional, ultra sparse, irregularly sampled, longitudinal data for predicting health risks from longitudinal clinical records. I will conclude with a brief discussion of some open problems.

Educational Objects: Upon completion, participants should be able to:

- Introduce applications of AI and machine learning across a broad range of problems in biomedical and health research

Disclosure Statement: The faculty and planners have no relevant financial relationship with ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing health care products used by or on patients.

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