2021-2022 Biomedical Data Science Innovation Lab: Ethical Challenges of AI in Biomedicine

Goal

Artificial Intelligence (AI) has great potential to assist in biomedical decision making. However, such systems are not immune from making erroneous recommendations, struggling to maintain patient privacy, and which give rise to vexing questions about their suitability across genders, ethnic, or cultural communities. The goal of the 2021-2022 *Biomedical Data Science Innovation Lab* is to foster the formation of new interdisciplinary collaborations which will generate creative strategies for addressing ethics of artificial intelligence (AI) in biomedicine.

This Biomedical Data Science Innovation Lab is intended to bring together expertise from the mathematical, statistical, basic science, and clinical biomedical fields, to address interdisciplinary topics in biomedical data science critical to how AI is implemented in clinical decision making. Members of the NIH-NCATS community are important contributors to these conversations. The 2021-2022 *Biomedical Data Science Innovation Lab* seeks to highlight the challenges of ethically working with datatypes in support of AI systems and how AI might be made ethical against best practice recommendations. It is anticipated that inter-disciplinary collaborations formed during the *Biomedical Data Science Innovation Lab* will result in new peer-reviewed publications or NIH/NSF grant proposals to further develop, refine, and test hypotheses and develop original research project ideas.

Description

This *Biomedical Data Science Innovation Lab* will promote collaboration between quantitative and biomedical researchers towards the development of novel or significantly adapted models, methods, and approaches for overcoming difficult ethical challenges of applying AI technologies in biomedicine.

The term “biomedical” used here is in the broadest sense to include Basic Science, Behavioral Science, Biology, Mental Health, Clinical Research, Epidemiology, Population-level Science and all areas of biomedical sciences where AI applications are desirable. Likewise, the term “quantitative” is being used to include Applied Mathematics, Computer Science, Data Science, Pure Mathematics, Natural Language Processing, Machine Learning, and Statistics which relate to the development of better models and approaches to automatically quantify biomarkers and/or make clinical recommendations.

AI Ethics and Values included a number of powerful, well-reasoned and noble principles which can guide team development and their activities: Safety; Failure Transparency; Judicial Transparency; Responsibility; Value Alignment; Human Values; Personal Privacy; Liberty and Privacy; Shared Benefit; Shared Prosperity; Human Control; Non-subversion. However, developing technical solutions and practices to help implement and verify these AI Ethics and Values principles has proven to be a substantial challenge. We believe that it is imperative for the scientific and research community to focus on this problem. The main goal of our workshop is to address technical obstacles and approaches in addressing those issues.

The consideration of ethical AI methods will undoubtedly be complex due to what is not present (missing data), and also what is implicit, such as an underlying model structure of dependencies or the trends, cycles, or other patterns arising across data sources. Collaborations between biomedical and quantitative scientists with relevant expertise will lead to better approaches to implementation and interpretation of such information.

At the *Biomedical Data Science Innovation Lab*, interdisciplinary teams will work together to ideate and develop pilot projects for tackling selected problems. Potential biomedical topics for the Biomedical Data Science Innovation Lab range across numerous dimensions such as those listed above. Project topics may lead to new insights and lay the groundwork for future advances in the study of how AI solutions can respect ethical boundaries and yet provide accurate recommendations.

Expanded Program

The *Biomedical Data Science Innovation Lab* is designed as an extended, exciting, hybrid program of online team-building activities, a series of scientific and mentor presentations, webinars by guest speakers, all culminating in a five-day in-person intensive event. Beginning in the first week of October 2021, our facilitation team will host a *Biomedical Data Science Innovation Lab* "kick-off" event in the form of a virtual "microlab". These sessions will allow the selected participants to get to know each other, begin to think about team activities and consider the focus topic of the ethical application of AI to biomedical decision making, making inferences on research results, etc. Follow-up microlabs will be held in April 8, May 13, and June 3, 2022.

Application

To be eligible to apply, candidates must be from a) the quantitative and data sciences and b) the biomedical fields, specifically involving AI methods, at the post-doctoral and junior faculty levels. The application will ask nominees to describe their background, research, interests in the intersection of the ethics of AI in biomedicine and data sciences, and their commitment to collaborative/team science. A broad diversity of backgrounds is welcomed with women and underrepresented scientific communities being strongly encouraged to apply.

Quantitative and data science researchers should provide examples of the types of data science approaches, methods, techniques and the potential to utilize these techniques in diverse research areas wherein AI might be applied. Investigators with firsthand experience working with data science methods, software, and visualization platforms such as Python, Cytoscape, Gephi, MATLAB, Neo4J, R & R Studio, Sci2 Tool, and Tableau are encouraged to apply.

Biomedical researchers should justify their research focus and be able to leverage data relevant to the ethics of AI in biomedicine.

Review of applicants will be rigorous and not all candidates will be selected to attend. A particular emphasis will be placed on candidates demonstrating a strong commitment to collaborative/team science and those with a high impact track record of peer reviewed publications. A committee will select approximately 30 of the applicants to take part in this one-of-a-kind event. Selected candidates will have their travel and hotel expenses fully covered though must commit to engaging in all 4 of the the virtual microlabs starting in October, 2021, as well as staying for the entire duration of the 5-day event June 13-17, 2022.

The deadline for applications is 11:59PM, Eastern Time, July, 30, 2021. APPLY TODAY! Please note that your application cannot be saved and returned to at a later time.