

Summer 2023
Internship Projects

Causal Fairness Analysis

Faculty Mentor: Mohammad Adibuzzaman

Fairness in data-driven decision machines and algorithms is an emerging point of discussion in the scientific, political, and policymaker communities. Common reasons for algorithmic biases include (not limited to) changes in data distribution, real-world interactions, user behavior, and shifts in data capture and management practices. Distinct computational methods are being rigorously developed to tackle this issue; however, there still exists controversy around estimating algorithmic biases and instigating algorithmic fairness.

Our research project investigates the causal pathways to identify, quantify, and address algorithmic bias. The research aims to diminish predictive biases (algorithmic inaccuracies in producing estimates that significantly differ from the underlying truth) and social biases (systemic inequities in care delivery leading to suboptimal health outcomes for specific populations). Using theories of causal inference, we explore structural causal and fairness models to disentangle complex causal puzzles and ways to mitigate these biases. Primarily, we are exploring computational approaches to identify predictive and social bias, point of bias generation, and ways forward for follow-up investigations. Additionally, we are looking for consistent evaluation and assessments of the algorithm over time and for all patient population cohorts. For this exploration, we are using existing benchmark datasets (COMPAS recidivism dataset) and the Cosmos population cohort in Epic. Computer Science/Informatics background recommended and algorithms course a plus!

AI for Retinopathy of Prematurity

Faculty Mentor: Pete Campbell

Our group focuses on the role of imaging, artificial intelligence, and data science/informatics in better understanding retinal disease, in particular retinopathy of prematurity. Specific topics include artificial intelligence for disease screening, diagnosis, monitoring and treatment, and advanced imaging techniques such as optical coherence tomography angiography. In addition, we collaborate with several groups around world to translate the results of our work to improve care of babies in low and middle income countries.

Analyzing the landscape of rare diseases for EHR-based screening

Faculty Mentor: Dr. Aaron M. Cohen

Individual rare diseases occur infrequently in the population but as a whole represent a considerable health issue. Rare diseases diagnosis is often delayed and complicated by sharing symptoms with more common diseases. In this project the intern will help access what are the most common and most distinctive symptoms across the landscape of rare diseases, using a combination of curated resources, manual review, and automated text processing. Python programming strongly recommended.

High Blood Pressure patient-facing clinical decision support

Faculty Mentor: Dr. David Dorr

High blood pressure is one of the most common chronic conditions in adults older than 50, and the most common contributing factor for heart attacks and strokes. Significant evidence exists about both pharmacologic and non-pharmacologic methods to lower blood pressure, but they require substantial shared decision making and patient motivation. The intern will help us with our patient-facing HBP

application; depending on their skill set, help programming, testing, or evaluating the tool with patients and care teams.

Evidence Synthesis for Stakeholder Groups

Faculty: EPC Core Investigators

This position supports evidence synthesis research and related projects for the Pacific Northwest Evidence-based Practice Center (<http://www.ohsu.edu/epc>) which conducts systematic reviews on health care topics for federal and state agencies, professional associations, and other organizations. These reviews report the evidence from research studies and the quality of that evidence for use by clinicians, employers, policymakers, researchers, and others in making decisions about the provision of health care services and health research. Depending on skillset and interests, the intern will participate in project meetings, import and de-duplicate text files of electronic database search results; code and manage EndNote library citations, perform abstract review, contribute to, format, and track report content, and assist with data visualizations. This is a great opportunity to learn more about health care research and systematic reviews.

Improving Matching of Patients to Clinical Studies

Faculty Mentor: Dr. William Hersh

Medical research advances when people volunteer to participate in clinical trials and other studies. One challenge is that patients are not identified or otherwise aware of studies in which they may take part. Our work focuses on using data from the electronic health record to identify patients who might be candidates for clinical studies. Python programming experience recommended.

Data Standardization

Faculty Mentor: Michelle Hribar

In order for clinical data to be used in large-scale projects for AI and machine learning, it has to be standardized. Data collected during ophthalmology exams has yet to be fully standardized, limiting its reuse for data science. Currently, there is a national effort to address this. This project will involve working with ophthalmologist and vision researchers at the National Eye Institute and other prominent academic institutions on any steps of the data standardization process: demonstration of the need for standards, identification of ophthalmic data elements that need standardization, consensus building on about standard definitions, and/or validation of the standards. [Note: there could possibly multiple projects here]

Telehealth

Faculty Mentor: Michelle Hribar

Many age-related eye diseases that result in irreversible vision loss have no advanced symptoms before vision loss, but can be detected early through eye exams and imaging. Unfortunately, access to eye care across Oregon can be limited due to geographic and socioeconomic factors. Casey Eye Institute is partnering with community health clinics throughout Oregon to establish telehealth screening programs to identify eye disease early. This ambitious project is in the pilot phase and will require informatics and data science work to monitor the effectiveness of screenings, patients' follow-up with eye care specialists, screening workflow efficiencies, and technological evaluation as the program is scaled to more clinics.

Understanding the Human Microbiome

Faculty Mentor: Dr. Lisa Karstens

Humans live in a symbiotic relationship with hundreds of microorganisms. These bacteria, fungi, and viruses that make up the human microbiome are essential for understanding human health and, more importantly, disease. To study the human microbiome, researchers often generate large datasets containing sequencing or metabolic information that is then associated with clinical and demographical information to address a clinical question. Intern projects include developing, testing, and improving the pipelines for handling these data for a variety of projects investigating the microbiome's role in relation to human disease, including bladder disorders, rheumatic disease, and cancer. Data include survey and questionnaire data from REDCap, 16S rRNA gene sequencing data, and metabolomics data. The projects will provide experience of analysis and biological interpretation of so-called 'big data' that arises from the rich and complex datasets generated by high throughput techniques used in basic research. Excellent record-keeping skills and self-motivation are essential. Some familiarity with programming and statistical analysis in R are preferred but not essential.

Land Ho! Mapping clinical informatics competencies by navigating DMICE courses - it's not quite Magellan's voyage, but it is a journey of discovery especially if you are interested in pursuing a career in clinical informatics.

Faculty Mentor: Vishnu Mohan, MD

Our core clinical informatics (CI) courses are utilized by students in our graduate certificate, masters, PhD and clinical informatics subspecialty fellowship program. We want to map the content of these core CI courses to defined competencies in the field, and develop an updated matrix that will help us understand how the courses we teach meet the competencies defined for clinical informatics. As an intern, you will survey eight CI courses, and review their syllabi, learning materials and associated content. You will get a comprehensive, in-depth exposure to one of the largest and most innovative CI programs in the nation. Plus, you will help to improve the training of informaticians, which is always a good thing (especially if you intend to be one of those informaticians trained!)

Assessing the impact of community nursing services on patient outcomes in rural settings

Faculty Mentor: Dr. Dana Womack

Patients who live with chronic illnesses in rural communities experience unique challenges accessing and utilizing healthcare services. As a project within ANF's Reimagine Nursing Initiative, we are collaborating with community-based Registered Nurses who address patient- and community-level gaps in two rural Oregon towns. We seek a student to support enhanced reporting of services provided by community nurses, and evaluation of the contribution of community nurse services to patient outcomes. Desired skills: experience in one or more aspects of the information systems development lifecycle, and/or familiarity with diagnostic and billing coding systems and value sets.