Postdoctoral Scholar: Causal, explainable machine learning & foundation models for medical imaging

The Montillo Lab (www.montillolab.org), a part of the Biodata Engineering Program of the Biomedical Engineering and Bioinformatics departments at the University of Texas Southwestern in Dallas,TX is looking for a full-time postdoc to develop novel deep learning (DL) methods and foundation models to analyze biomedical images (including neuroimaging) & multi-omic data.

Our lab's primary focus is on developing the theory and application of DL and causal modeling to elucidate treatment mechanisms and guide prognosis and treatment decisions, with applications in neurological disorders and cancer therapy. We develop *the theory of DL* by improving how DL models generalize to data distribution shifts, and enabling models to identify and quantify *causal* relationships, rather than merely quantify predictor-target *correlations*. Using our experience developing new deep learning (DL) frameworks that enable any neural network to handle sample clustering from repeat measure data, we aim to develop novel approaches integrating ideas from causal discovery and inference with Bayesian DL. In our clinical applications, for example in Parkinson's Disease (PD), when standard drugs fail to provide adequate relief, deep brain stimulation (DBS) surgery can be restorative; however, there is no tool to identify who will respond or how it works. Based on our success in developing causal neuroimaging measures that predict disease trajectory, we aim to develop outcome predictive models by fusing neurologists' knowledge with explainable DL and efficient tailoring of multimodal foundation models (FMs).

With cutting-edge computational infrastructure, access to neuropathophysiology and oncology experts, and an unparalleled trove of medical images and multi-omic data, our machine learning lab in the BME and Bioinformatics departments of a leading university and academic medical center is poised for success in these research endeavors. What we need now are brilliant postdocs who are eager to innovate, think beyond traditional models, and explore bold new directions in biomedical research.

The ideal candidates will have:
- A PhD in computer science, biomedical or electrical engineering, statistics, physics, or any related field providing a firm computational/analytical background.
- Publications demonstrating algorithmic innovation.
- Strong programming ability and experience with machine learning.

Previous experience in image analysis (e.g. MRI, PET), PEFT for FMs, explainable AI, causal discovery/ inference is advantageous, but not mandatory. Candidates with a strong neuroscience, oncology, or radiology background may be considered if they have exhibited a commitment to mastering ML.

Through close collaborations with neurologists, psychiatrists, surgeons, and neuroscientists, our lab offers truly interdisciplinary training: you will work on problems at the cutting edge of machine learning and pathophysiology. We are a dynamic and forward-thinking lab situated at the forefront of two rapidly growing departments committed to an entrepreneurial approach to research, with a flexible work culture and competitive compensation. Additionally, our university provides world-class computational resources (portal.biohpc.swmed.edu) and research-dedicated high field imaging (utsouthwestern.edu/departments/airc) so that your efforts are focused solely on scientific innovation.

The position is available immediately and we will accept applications until the position is filled; early application is strongly recommended. Apply by email to Dr. Montillo (albert.montillo@utsouthwestern.edu) and include:
1. Your CV
2. A statement of research accomplishments and interests
3. Contact information for 3 references