Understanding Aging at Multi-scale Using Explainable AI

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As human lifespans continue to extend, it becomes increasingly critical to understand the aging process not only to increase lifespan but also to enhance healthspan. This talk explores how Artificial Intelligence (AI), coupled with Explainable AI (XAI), can illuminate the complex mechanisms of aging at multiple scales, enhancing our ability to predict and explain these processes transparently.

First, I will introduce my work in AI for personalized health insights. I will present the ENABL Age framework, which integrates AI and XAI to provide precise and interpretable assessments of biological aging. This model not only estimates biological age but also explicates the factors contributing to aging, offering insights for personalized health strategies.

Second, I will discuss my AI innovations in omics data analysis, with a focus on cancer as an age-related disease. I have designed DeepProfile, which analyzes large-scale cancer datasets to identify key biomarkers and pathways, enhancing our approach to precision oncology. Additionally, I have developed StrastiveVI, which further isolates aging-related signals from single-cell transcriptomic data, revealing universal aging patterns and facilitating targeted anti-aging interventions.

Third, the discussion will turn to our pioneering work in the automated generation of plain language, democratizing access to complex biomedical findings and enhancing public health literacy. This work advances biomedical communication by enabling more comprehensible health-related information.

In conclusion, I will outline a vision for future directions in integrating transparent AI with aging research. This effort requires extensive collaboration across biology, clinical science, AI research, public health, and data science. Emphasizing a multidisciplinary approach, we aim to address the complex challenges associated with aging, paving the way for innovative solutions that not only enhance the precision but also the accessibility of healthcare.

ABOUT the SPEAKER

Wei Qiu is a final-year PhD student in Computer Science & Engineering at the University of Washington, advised by Professor Su-In Lee. Her research intersects the fields of Artificial Intelligence (AI), Explainable AI (XAI), and computational biology, focusing on aging and age-related diseases. She develops transparent AI models that enhance personalized health insights and make real and impactful biological discoveries and applications across different research areas such as population health, genomic analysis, single-cell transcriptomics, and natural language processing. Her contributions have been recognized in prominent biomedical journals such as Nature Biomedical Engineering and Lancet Healthy Longevity, and at AI conferences including ICML and AAAI. Her research has resulted in real-world impact; for instance, her ENABL Age model is used by biotechs like NOVOS to provide free biological age tests. Wei collaborates broadly with institutions such as UW Pathology, BIME, Nathan Shock Center, Harvard Medical School, UIUC, and EPFL. She holds an MS in Computer Science from the University of Washington and a BS in Data Science from Peking University. Previously, she interned at Genentech and was a visiting student at Harvard Medical School.

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