Elshadai Kassu Tegegn

Navigating from Ethiopia's bustling streets to MIT's cutting-edge labs, my journey as a young black woman in tech has always been about defying expectations and dismantling barriers. With a fresh software engineering degree and a robust background in machine learning, my sights are set on Columbia University’s Ph.D. program in computer science. My objective is to delve further into explainable AI and reinforcement learning research in line with Columbia's profound commitment to research and innovation, particularly in computer science, and its vibrant, interdisciplinary environment.

My initiation into AI/ML, sparked by a project classifying breast cancer cells at Tennessee Tech University under the Global UGRAD Exchange scholarship program, kindled a passion for research that has propelled me thus far and will continue to drive my academic journey forward. My passion guided me to a research internship at MIT's Summer Geometry Initiative, a prestigious yet challenging opportunity that felt like deciphering a new language of unknown concepts and methods in serious research. Through persistent self-study, mentor guidance, and peer discussions, I navigated the complexities of research, working on projects like plane and edge detection using the RANSAC algorithm, revisiting computational caustics, and out-of-context data augmentation for 3D scenes. This pivotal experience not only deepened my understanding of machine learning, geometry processing, and computer vision but also paved my way to the competitive Cornell-Maryland Max-Plank pre-doctoral fellowship. In 2023, I further contributed to the MIT Initiative, innovating in geometric fracture assembly and creating an evaluative metric that inspired an open-source assembly challenge as a volunteer."

In my professional path at Amazon and Audible Inc., I tackled a range of projects, including image annotation, optimizing search for image labels, end-to-end services,

frontend development, backend development, and working with the AWS CDK. During a machine learning research internship at Instadeep Ltd., I worked on the Mava and Jumanji open-source projects to improve my skills and make a difference. Contributing to InstaDeep's "Jumanji" project, currently under review at ICLR 2023, provided a rich learning canvas. By creating a "Graph Coloring Environment" and using Transformers to optimize rewards in an actor-critic network, I learned a lot about how to solve combinatorial problems and make better decisions in this area. Adding the "Sliding Tile Puzzle" environment also showed how well Multi-Layer Perceptrons (MLPs) can navigate classic puzzle solution spaces. This required a lot of testing and validation to make them more reliable and useful for RL and AI research.

My position as President of ShARE AAU/AAiT, where I oversaw strategic post-COVID-19 consulting and initiatives like "Girls Can Code," which reflect my commitment to removing barriers to technology access and which has its roots in my experiences growing up in Ethiopia, serves as an example of my technical journey, which combines societal impact and leadership. My resolve to diminish disparities in tech and education is further amplified through programs like "Africa to Silicon Valley (A2SV)" and "Black in AI", ensuring diverse voices shape the technological future. In entrepreneurship, my co-founded venture, Knovuslab, unveiled Motorride, which, beyond a business, embodies my belief in technology as a key to societal solutions, addressing mobility issues with solutions borne from technical expertise and an understanding of local challenges.

My diverse exposure to AI/ML, ethical technology applications, geometry processing, and criminological studies has guided my specific research interests towards Columbia University's offerings.

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- Prof. David M. Blei's impactful work in machine learning and probabilistic modeling, particularly his development of probabilistic topic models, directly resonates with my exploration into computational caustics and geometry processing. His steadfast commitment to supplementing research with practical, open-source contributions parallels my own journey with projects like "Jumanji" and provides a framework for collaborative exploration into deeper ML models and their practical applications.
- Prof. Jeannette M. Wing: The explorations into trustworthy AI and the related ethical, security, and privacy considerations under Prof. Wing's guidance could significantly augment my existing foundation in ethical AI and ML applications. My endeavors have always intertwined technology and ethics, and navigating through the terrains of trustworthy computing with Prof. Wing could help meld my technical proficiency with principled AI research and application.
- Prof. Julia Hirschberg: Her groundbreaking work in NLP and computational linguistics can open vistas for me in the realm of AI and linguistics. Having explored decision-making and reinforcement learning in complex environments, Prof. Hirschberg's expertise could aid my transition into ensuring AI models comprehend and communicate effectively in human linguistic structures, enhancing their applicability and utility.

The work that these professors do across different fields fits perfectly with what I have already done and what I want to do in the future: I want to study AI and machine learning technologies that are morally sound, reliable, and usable all over the world. Specifically, I want to look into the areas where reliable machine learning

models, ethical deployment, secure data systems, and useful human-computer interaction meet.

Pursuing a Ph.D. at Columbia University enables me to merge technical expertise and ethical technology practices, advancing socially impactful AI/ML globally. My journey, intertwining AI research, ethical tech use, and inclusivity advocacy, positions me to both contribute to and benefit from Columbia's dynamic academic environment. I aspire not only to advance my AI and ML knowledge but also to pave paths for underrepresented STEM groups, championing diverse and globally representative tech leadership. From Ethiopia to Columbia, my path, though varied, consistently leverages technology to formulate ethical and inclusive global solutions. Thank you for considering my application. I'm eager to contribute to and learn from the esteemed Columbia community.

Warm Regards,

Elshadai Kassu Tegegn