Statement of Purpose

Sarah Chen

PhD Application in Computer Science

During my undergraduate research at the University of Washington, I encountered a moment that crystallized my commitment to pursuing a PhD in artificial intelligence for healthcare. While presenting my work on neural machine translation to our lab, a visiting clinician asked a simple question: "Could this help us understand radiology reports better?" That conversation sparked my journey into medical AI—a field where I believe computational innovation can have profound human impact.

My path to this intersection of AI and healthcare has been shaped by both technical exploration and a deep conviction that our most powerful algorithms should serve our most pressing needs. As someone who grew up watching my grandmother navigate a complex healthcare system while managing multiple chronic conditions, I've witnessed firsthand the critical importance of accurate diagnosis and clear medical communication. This personal connection drives my research ambition: to develop AI systems that augment clinical decision-making and ultimately improve patient outcomes.

My master's research at UC Berkeley has allowed me to pursue this vision through developing multimodal learning approaches for medical image analysis. Working with Professor Jennifer Park, I've focused on creating transformer-based architectures that integrate CT and MRI scans to enhance diagnostic accuracy. This work addresses a fundamental challenge in medical imaging: different modalities capture complementary information, yet current systems often analyze them in isolation. Our cross-modal fusion transformer, published at MICCAI 2024, demonstrated a 12% improvement in diagnostic accuracy for detecting pancreatic lesions compared to single-modality approaches. More importantly, through our collaboration with UCSF Medical Center, I've learned to measure success not just in accuracy metrics but in clinical utility—ensuring our models provide interpretable insights that physicians can trust and act upon.

This research has taught me that technical innovation in medical AI requires more than algorithmic sophistication; it demands deep engagement with clinical workflows, careful attention to model interpretability, and rigorous validation with domain experts. Working alongside radiologists,

I've gained appreciation for the nuanced judgment required in medical diagnosis and the critical importance of AI systems that augment rather than replace human expertise. These experiences have shaped my approach to research: I believe the most impactful AI systems are those developed through genuine interdisciplinary collaboration.

My earlier research experiences laid the groundwork for this interdisciplinary approach. As an undergraduate at the NLP lab at University of Washington, I investigated attention visualization techniques for neural machine translation, which sparked my broader interest in model interpretability. This work, which won the Best Paper Award at our undergraduate research symposium, explored methods for making black-box models more transparent—a skill that has proven invaluable in medical AI, where clinicians rightfully demand to understand model reasoning. My summer internship at Microsoft Research further expanded my technical toolkit, where I worked on few-shot learning for low-resource language translation. The meta-learning techniques I developed there have directly influenced my current work on adapting models to rare medical conditions with limited training data.

Looking forward to my PhD, I am excited to deepen my work in three interconnected areas. First, I want to explore foundation models for medical imaging—developing large-scale pre-trained models that can be efficiently adapted to diverse diagnostic tasks and rare conditions. The recent success of foundation models in natural language processing suggests tremendous potential for similar approaches in medical imaging, particularly for addressing the long tail of rare diseases. Second, I am passionate about advancing interpretable and trustworthy AI for clinical settings. I believe that effective human-AI collaboration requires not just accurate predictions but also transparent reasoning that clinicians can validate and learn from. Finally, I am interested in few-shot and transfer learning approaches that can enable AI systems to generalize across different hospitals, imaging protocols, and patient populations—a critical challenge for deploying medical AI equitably.

I am particularly drawn to [University Name] because of its commitment to impactful, interdisciplinary research at the intersection of AI and healthcare. [Professor Name]'s work on [specific research area] closely aligns with my interests, and I am excited by the opportunity to contribute to [specific project or lab initiative]. The collaborative environment at [specific lab or center], with its partnerships between computer scientists and medical professionals, represents exactly the kind of setting where I believe the most meaningful advances in medical AI will emerge. Additionally, [mention any other specific resources, collaborations, or aspects of the program that attract you].

Beyond research, I am committed to fostering inclusive environments in computing. As Vice President of Women in Computer Science at Berkeley, I've worked to create mentorship programs and research opportunities for underrepresented students. I've seen firsthand how diverse perspectives strengthen research and lead to more equitable technologies. I look forward to continuing this work at [University Name] and contributing to building a research community where everyone can thrive.

My teaching experience as a Graduate Student Instructor for CS 189 at Berkeley has reinforced my belief that education and research are deeply interconnected. Helping students grasp complex machine learning concepts has sharpened my ability to communicate technical ideas clearly—a skill essential for interdisciplinary collaboration. It has also reminded me of the importance of nurturing the next generation of researchers who will continue advancing AI for social good.

As I look toward my PhD, I am driven by a vision of AI systems that meaningfully improve healthcare delivery. I believe that by combining rigorous technical innovation with deep clinical collaboration, we can develop tools that enhance diagnostic accuracy, reduce healthcare disparities, and ultimately save lives. I am eager to pursue this vision at [University Name], where I can contribute to pushing the boundaries of medical AI while learning from world-class researchers and clinicians. The opportunity to join your community of scholars represents not just the next step in my academic journey, but a chance to work toward research that truly matters.