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Roshni Patel
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Quantitative and Computational Biology

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Department of Data Science
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Eugene, OR 97403

Dear members of the search committee:

I am writing to submit my application for the open faculty position in the Department of Data Science at the University of Oregon. I am currently a postdoctoral researcher with Michael "Doc" Edge in the Department of Quantitative and Computational Biology at the University of Southern California. As a statistical geneticist, I develop methods to study human complex traits across populations. I also work on questions related to the social and ethical implications of human genetics. For this interdisciplinary work, I was named an Emerging Genomic Scientist Fellow. My research has been accepted to journals including *Cell Genomics*, the *American Journal of Human Genetics*, and *Genetics*. I previously earned a PhD in Genetics working with Jonathan Pritchard at Stanford, where I also received the Stanford Student Award for Excellence in Teaching.

My research integrates evolutionary modeling, statistical methods development, and biobank-scale genomic data analysis. Many statistical methods seek to characterize the genetic variation underlying human complex traits, but few explicitly model the evolutionary forces that shape this genetic variation. As a result, existing methods are also generally unsuitable for analyzing data from multiple populations—particularly if those populations have experienced different evolutionary histories. My work consists of developing evolution-informed methods to understand how genetic variation gives rise to complex traits, and how this variation is distributed across populations.

In my doctoral work, I developed a novel method to test whether genetic interactions influence complex traits, which was published in the *American Journal of Human Genetics*. This method incorporated information from multiple populations, uncovering evidence for pervasive genetic interactions that earlier studies were underpowered to find. In another line of work, I developed an approach that combined allele frequency data across populations to determine which kind of selection acts on complex traits. My results shed light on a long-standing debate between competing models of selection on human complex traits, and our manuscript has been accepted at *Genetics*. In ongoing work, I am incorporating models from phylogenetics to develop a robust method to control for genetic confounding in epidemiological association studies.

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A second theme of my research program relates to the ethical, legal, and social implications (ELSI) of human genetics research. In recent work published in *Cell Genomics*, I sought to understand how tailored ethics education could empower human geneticists to conduct responsible and impactful research. As a statistical geneticist with a history of collaboration with bioethicists, I am uniquely positioned to study the rationale behind and impacts of certain scientific practices in population and statistical genetics.

I have taught courses in a wide array of settings, ranging from introductory Python for undergraduates to bioethics for graduate students. For the latter, I developed the curriculum and was the instructor of record for two years. Consequently, I am prepared to teach both undergraduate- and graduate-level courses in topics such as biostatistics, linear models for biology, bioinformatics data analysis, and science and society.

The research focus and broader mission of the new Department of Data Science make this position remarkably compelling to me. My research on human complex traits complements the department's existing strengths in evolutionary genomics and statistical forensic genetics. This synergy lends itself to collaborations with Rori Rohlfs or Peter Ralph, as well as with Ashley Cordes and others studying data ethics. This department also reflects my goals and experience as an educator: instructing students in how to use quantitative methods to understand the world, and equipping them with the tools to do ethical and impactful work. Lastly, I deeply value building equitable and inclusive communities, and I have a long-standing track record of doing so, both within a research group and within a broader institution. I would therefore be thrilled to contribute to advancing quantitative research and teaching in a department that shares so many of my interests, skills, and values.

Thank you for your consideration, and I look forward to hearing from you.

Sincerely,

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