DATA SCIENCE AND HUMAN-ENVIRONMENT SYSTEMS

Transformation of the Earth's social and ecological systems is occurring at a rate and magnitude unparalleled in human experience. Data science is a revolutionary new way to understand human-environment relationships at the heart of pressing challenges like climate change and sustainable development. However, data science faces serious shortcomings when it comes to human-environment research. There are challenges with social and environmental data, the methods that manipulate and analyze the information, and the theory underlying the data science itself, as well as significant legal, ethical, and policy concerns. This timely book offers a comprehensive, balanced, and accessible account of the promise and problems of this work in terms of data, methods, theory, and policy. It demonstrates the need for data scientists to work with human-environment scholars to tackle pressing real-world problems, making it ideal for researchers and graduate students in Earth and environmental science, data science, and the environmental social sciences.

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Preface

The primary rationale for this book is that researchers play an essential part in addressing the many challenges that beset the world. Data science is increasingly important to understanding the human-environment relationships at the heart of such critical issues as climate change, natural hazards, and sustainable development.

A narrower reason (undoubtedly shared by many authors) is that I could not find a book quite like this one. There is excellent work out there, and I cite much of it, but I wanted a volume firmly at the intersection of information, social, and environmental sciences. There is much room to bridge various camps of scholarly work on big data and data science for human-environment systems. Of course, there is the risk of trying to cover too much ground or not offering enough. Hopefully, that is not too much of a problem, but we will see.

We have got our work cut out for us. Data science and cognate fields like big data and artificial intelligence hold great promise for studying human-environment systems. At the same time, human-environment research offers much to data science in terms of sophisticated approaches to compelling real-world problems. Serious shortcomings exist in social and environmental data, some of which we are only beginning to see. There are many ways that we can make our methods better and, at the same time, work on the theories underlying the data science of human-environment systems. We also need to be aware of significant legal, ethical, and policy concerns. However, with luck, we can use the tools of data science and human-environment research to address these concerns.

Once we get past the starry-eyed embrace of data science or its often justified critiques, there is a middle ground or many potential middle grounds in human-environment research. This sounds pollyannaish, but we must collaborate to deal with our collective challenges. It can be hard to remain hopeful in the face of what seems to be one unfolding calamity after another – war, famine, disease, disaster – that are usually expressions of long-running human–environment dynamics.

Nonetheless, we are making many forms of progress, and scholarly inquiry is part of that effort.

Data science is also the locus of much interest and training for next-generation scholars and data professionals who will drive future research. I am privileged to work with bright and passionate students who recognize the need for transdisciplinary collaborations among data scientists, domain experts, and everyone else interested in solving our collective problems. It is increasingly their world, and they need all the help we can give them.

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