

Choosing to be Scientific About Data Analysis

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Abstract

Critical analysis of the use of machine learning and statistical inference in scientific methodology requires a perspective on science that is suited to the task. It is possible to provide such a perspective by viewing scientific knowledge as social knowledge that is socially constructed by communities of researchers who make specific choices about how they use specific tools to build that knowledge. This perspective does not diminish claims of the relative epistemic strength of scientific knowledge, but it does show how careless use of mathematical and computational methods in knowledge-building and model validation can result in costly losses of epistemic strength. It also suggests a different approach to using mathematical analogies in epistemology which allows for a clearer focus on the importance of unacknowledged metaphysical stances taken on validation by researchers. When data analysis is considered in this perspective, it will be possible to show how the most practically useful assessments of new methods require a humanist perspective based on the sociology and philosophy of science to complement currently existing methods of assessment.