



An application of Carnapian inductive logic to an argument in the philosophy of statistics



Teddy Groves*

University of Kent, Flat 2, Pheonix House, 72A High St, Rochester, Kent, ME1 1JY, UK

ARTICLE INFO

Article history:

Received 12 September 2013

Available online 21 May 2014

Keywords:

Inductive logic

Carnap

Popper

Falsificationism

Philosophy of statistics

Model choice

ABSTRACT

I claim that an argument from the philosophy of statistics can be improved by using Carnapian inductive logic. Gelman and Shalizi [9] criticise a philosophical account of how statisticians ought to choose statistical models which they call ‘the received view of Bayesian inference’ and propose a different account inspired by falsificationist philosophy of science. I introduce another philosophical account inspired by Carnapian inductive logic and argue that it is even better than Gelman and Shalizi’s falsificationist account.

© 2014 Elsevier B.V. All rights reserved.

1. Introduction

The structure of this paper is as follows: Section 2 introduces the notion of a philosophical account of statistical model-choice, starting with the ‘received view’ account according to which statistical models represent all relevant factors of a statistical investigation. It summarises Gelman and Shalizi’s criticism of this account. In contrast to the received view, Gelman and Shalizi see statistical models as representing only the beginning of a statistical investigation; they argue that statistical models cannot and should not describe the important tasks of searching for ways in which models fail, and then conceiving of improved models on the basis of this testing. Section 2 ends by presenting the ‘falsificationist’ account, which Gelman and Shalizi introduce as an improvement on the received view.

Section 3 develops an alternative ‘Carnapian’ account of statistical model-choice. In Section 4 I argue that the Carnapian account is a further improvement: it shares the advantages that Gelman and Shalizi identify in the falsificationist account, and in addition is more technically fruitful and philosophically well-grounded.

Finally, Section 5 addresses several qualms about Carnapian inductive logic which might cause misgivings about a model-choosing philosophy inspired by it.

* Tel.: +44 7747128872.

E-mail address: groves.teddy@gmail.com.

2. Gelman and Shalizi’s arguments

2.1. Philosophical accounts of statistical model-choice

Gelman and Shalizi [9], like this paper, concerns collections of succinct stipulations as to how statisticians ideally ought to conduct investigations involving probabilistic models. I call these collections ‘philosophical accounts of statistical model-choice’. In order to make it easy to discuss shared features of different approaches at the same time, I do not require that accounts of statistical model-choice specify an approach to ideal model-choice completely.

Philosophical accounts of scientific methodology are important because they can influence scientific research. As Gelman and Shalizi put it,

... even those [scientists] who believe themselves quite exempt from any philosophical influences are usually the slaves of some defunct methodologist.

Gelman and Shalizi [9, p. 31]

2.2. Criticism of the ‘received view of Bayesian inference’

Gelman and Shalizi aim to counteract the influence of what they call ‘the received view of Bayesian inference’, a philosophical account of statistical model-choice that, they claim, has had a negative effect on statistical research. According to the received view, Gelman and Shalizi write,

Anything not contained in the posterior distribution $p(\theta | y)$ is simply irrelevant...

Gelman and Shalizi [9, p. 9]

I therefore consider the following, slightly more general, stipulation to be a key tenet of the received view:

RV All desiderata that are relevant in a statistical investigation should be represented formally in a statistical model. Other factors should be disregarded.

This stipulation does not amount to a fully-fledged philosophy of statistics and therefore should not be seen as encapsulating the received view, which must include other stipulations: perhaps that models should be chosen so as to fit given data. Nonetheless, since it is where Gelman and Shalizi focus their criticism, this is the only aspect of the received view that we need to consider.

Gelman and Shalizi argue that **RV** is incompatible with certain facts about statistical research as it goes on in the real-world, as there are important uses in statistical investigations for knowledge that is not represented by a statistical model.

In Gelman and Shalizi [9, §3] they argue that it is practically impossible to represent all the assumptions that might be entertained during the course of an investigation in the form of a statistical model.

In [9, §4], Gelman and Shalizi claim that knowledge that is not represented in a statistical model plays an important role in model-checking. Bayesian models are typically tested by investigating the ways in which empirical data differs from data simulated using the fitted model. Statistician’s knowledge enables them to devise tests which distinguish unimportant, patternless discrepancies which can safely be ignored from systematic differences which might cause the model to be revised. According to **RV**, such knowledge should be disregarded unless it is represented in a statistical model: Gelman and Shalizi [9, §4.3] argue on methodological grounds that this is not always feasible.

Download English Version:

<https://daneshyari.com/en/article/4662867>

Download Persian Version:

<https://daneshyari.com/article/4662867>

[Daneshyari.com](https://daneshyari.com)