Machine learning as a source of epistemic justification

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Supposing machine-learning methods to constitute *a* source of epistemic justification, do they constitute a *distinct* such source?

Overview

1) Background to the question and some terminology
2) Distinct sources of justification in analytic epistemology
3) Distinct ‘secondary’ sources of justification
4) Machine-learning methods as a distinct secondary source of justification

Background and some terminology

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A machine-learning program is any computational program that can improve its performance in some task(s) *t*, with respect to some performance measure *p*, by means of experience *E*, where *E* typically consists of observed instances relevant to *t*.

(Cf. Mitchell, 1997; Alpaydin, 2004; Mohri, et al., 2012)

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Examples of machine-learning programs include those that incorporate the

1) Support Vector Machine and
2) Backpropagation

algorithms.

Background and some terminology

A machine-learning method is any method that uses some machine-learning program(s) *m* as a (partial) means to achieve some objective *o*.

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Examples of machine-learning methods include the methods for

1) seismic event identification in Dong et al. (2014) and
2) lung image classification in Sun et al. (2016).

Background and some terminology

Epistemic justification for some proposition *p* is that in virtue of which it is epistemically reasonable or appropriate for some subject *s* to believe *p*.

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Examples of epistemic justification include

1) *s*'s visual perception of people in this room,
2) *s*'s belief that similar rooms hold *n* number of people, and
3) the life scientist's observation of cells altering in some way through an electric microscope.

Distinct sources of justification in analytic epistemology

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Sources of epistemic justification are typically claimed to include

1) perception,
2) memory,
3) testimony,
4) introspection, and
5) reason.

(Cf. Audi, 2003)

Distinct sources of justification in analytic epistemology

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4) if s_2 involves a distinct or additional capacity *c* to s_1.

Distinct sources of epistemic justification

A source of epistemic justification, s_2, is distinct from or additional to some other source of such justification, s_1, if s_2 involves a distinct or additional capacity, *c*, to s_1 and only if there is some set of possible beliefs *B*, determined by *c*, that could not be justified in the absence of s_2.

Distinct sources of justification in analytic epistemology

Under the account above, distinct sources of justification include

1) perception,
2) memory,
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Distinct sources of justification in analytic epistemology

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1) perception,
2) memory,
3) testimony,
4) introspection,
5) reason,

6) visual symbol manipulation, and,
7) electron microscopy.

‘Secondary’ sources of justification

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A ‘primary’ source of epistemic justification is internal to the epistemic subject.

A ‘secondary’ source of epistemic justification is external to the epistemic subject.

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‘Secondary’ sources of justification

Under the account above, distinct sources of justification include

1) *perception*,
2) *memory*,
3) testimony,
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primary sources of justification

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‘Secondary’ sources of justification

Under the account above, distinct sources of justification include

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secondary sources of justification

Machine-learning methods as a distinct secondary source of justification

Supposing machine-learning methods to constitute *a* source of epistemic justification, do they constitute a *distinct* (secondary) such source?

Machine-learning methods as a distinct secondary source of justification

Is the addition of machine-learning methods to all current sources of epistemic justification such that

1) it involves an additional capacity, *c*, to those sources and
2) there is some set of possible beliefs *B*, determined by *c*, that could not be justified in the absence of the methods?

Machine-learning methods as a distinct secondary source of justification

Example (1)
Seismic event identification
(Dong et al., 2014)

In instances like (1), machine-learning methods

1) extend the capacity for calculation, for example, of Bayesian probabilities, but
2) do not involve a capacity additional to those of all current sources of epistemic justification.

Machine-learning methods as a distinct secondary source of justification

Example (2)
Lung image classification for cancer risk
(Sun et al., 2016)

In instances like (2), machine-learning methods

1) extend the capacity for calculation, for example, of linear algebraic relations,
2) might involve a capacity distinct from or additional to those already found in all current sources of epistemic justification, and

there might be some set of possible beliefs *B* that could not be justified in the absence of the methods.

Conclusion

In many instances, machine-learning methods do not constitute a distinct source of epistemic justification, because they do not involve a capacity additional to those already found in all current sources of such justification.

In some instances, the methods might involve such a capacity and there might be some set of beliefs that could not be justified in their absence. In such instances, the methods might constitute a distinct secondary source of epistemic justification. Further argument is required.

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