STAT4700 Paper 1

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In this paper, I examine both the concepts of the problem of induction and the new riddle of induction. The first section of this paper goes through both concepts, defining them and relating them both to statistical analysis. The second section of this paper will go into more detail on the differences (or similarities) between the two concepts, and why I claim that the new riddle of induction is just a subset of the problem of induction. The last section will cover the proposed solutions, I then claim that there is one solution that outweighs the benefits of others.

The Problem of Induction

There are some studies that suggest that people make, on average, 35000 decisions every day [Psychology Today, 4]. It is hard to conceptualize a number that big in this context, but almost every action and spoken word is based on some type of decision-making process, even if it is only thought of for a second. Some decisions might be as small as deciding which table to sit at, or what route to take to work. The bigger decisions have more of a thought process, for example, which college one will attend, or which job offer to accept. Decisions are a large part of the path we walk in life, so naturally, one would wonder *why* we make these decisions, and what leads us to do so. We can and should ask the same question when it comes to more specialized matters, matters akin to science and statistics, which are a large part of our reality and how we conceive the world around us. It turns out that the answer to this question is a problem in itself, appropriately named *the problem of induction*.

The decision-making that goes into deciding which job offer to take and which statistical method produces the best outcome is called inductive inference, which provides a road map for the different types of methods that are used to find the said outcome. For example, inference to the best explanation, induction by enumeration, and inference from analogy are three types of inductive inference that are used in science and statistics very commonly, along with regular decision-making processes. Even though this helps us conceptualize how one got to a conclusion, it still does not fully justify this conclusion. This is the problem of induction. There are many who define the problem of induction, so I will generalize many of these definitions into two parts; the first being the problem of justifying the specific conclusion and why that is the best answer, the second being justifying the methods used to obtain said answer. Many suggest that this is an unsolvable problem, that it is impossible to ever one hundred percent prove that the conclusion that was come to is the ‘right’ or ‘best’ conclusion (in both senses). Later in this paper, I will go over some proposed solutions to the problem of induction.

The New Riddle of Induction

David Hume was a Scottish philosopher and is known for being the first person to write extensively about the problem of induction in 'A Treatise of Human Nature' published in 1739. Since then, philosophers and scientists alike have been either trying to solve this problem, or proving that it is not a problem that needs to be solved at all. This was until Nelson Goodman proposed *the new riddle of induction.* The basis of this argument is trying to distinguish between lawlike and non-lawlike arguments. The difference being lawlike arguments are able to be confirmed, while un-lawlike generalizations are not. His classic example is;

(*P1*) = This one piece of copper conducts electricity
(*P2*) = This one man in this room is a third son

If (*P1*) is true, then this confirms that all pieces of copper should conduct electricity, but the same cannot be said for (*P2*). If (*P2*) is confirmed, this does not prove that all men in that room are a third son, and even if all the men in the room were to be third sons, this is accidental and still does not prove a lawlike statement. "Lawlike statements, in contrast to accidentally true general statements, are confirmed by their instances and support counterfacts"[Goodman's New Riddle].

Comparison and Discussion

Although the new riddle of induction stemmed from the problem of induction, they are not one in the same. Nelson argues that the new riddle of induction is somewhat of an updated version of the problems we face in justification. Nelson says "The problem of justifying induction has been displaced by the problem of defining confirmation, and our work upon this has left us with the residual problem of distinguishing between confirmable and non-confirmable hypotheses"[Philosophy of Statistics]. He also goes on to critique Hume's stance in that he does not take into account that predictions based in past regularities/patterns is not always true. In this I agree with Nelson, that Hume's definition was not taking into account that we cannot rely on past regularities to define what is 'normal' or 'expected'. I do not fully agree with Nelson's definition of what the true problem is. Although Hume had overlooked this crucial part in defining what the social 'norm' and acceptance should be, it does not crumble the foundation of the original issue brought up. If we were to accept Hume's criticism; then this adds to the problem in a new way. Hume also states "This is why the new riddle of induction, which is more broadly the problem of distinguishing between projectible and non-projectible hypotheses, is as important as it is exasperating"[Philosophy of Statistics]. Although his position does tackle the issue of confirmation of the conclusion, his proposition that the new riddle of induction is an updated version of the original problem is wrong in the sense that it does not cover all the issues that the problem of induction does, including why we use certain methods.

Furthermore, I claim that Nelson's use of hypothesis testing for confirming lawlike practices is in fact a good idea but again points back to the original problem of induction. Hypothesis testing in statistics is more so than theorizing, it is testing the probability of an idea assumed to be true. How can we know to test this specific hypothesis to get an insight on lawlike conclusions if you are already assuming the conclusion, whether it be true or false? I claim that the new riddle of induction is not an updated version of the original problem at hand, but rather a specific subset of said problem.

There have been many proposed solutions to the problem of induction, and I will now go over a few that are widely known. The new riddle of induction does not have specific 'solutions', maybe because it is a newer concept and has not been around as long as the original problem, but it could also be due to the fact that the new riddle of induction is seen as one in the same, or a subset, of the problem of induction.

Solutions

The first proposed solution comes from Hans Reichenbach in 1938, which has been given the name Pragmatic Vindication, which stems from the idea that this 'solution' is vindictive and not actually justifying the problem. His proposed 'solution' is that the problem of induction is that there is no solution and that following the inductive principle is the best one can do.
The formal learning theory is based on optimization. This theory states that using usual inductive practices is reasonable because the induction itself has standards for being as efficient as possible. Then there is the idea of meta-induction. This theory is in itself another definition of the problem of induction. It "draws a distinction between applying inductive methods at the level of events – so-called "object-level" induction, and applying inductive methods at the level of competing prediction methods – so-called "meta-induction"[Stanford Encyclopedia of Philosophy]. Gerhard Schurz created a "meta inductive strategy", called "wMI", that creates a weighted average for each method, where the weights are different between each methods' success rate.

Out of these proposed solutions, the formal learning theory holds the most ground. The Pragmatic Vindication has too many outside factors, including the 'straight rule'. I claim that the third solution, meta-induction, is not a strong solution. Again, this solution has created a 'model' of some sort to define a success rate. This is contradictory to being a solution at all. The formal learning theory is based on optimization, which in statistics, makes the most sense to go off of. This solution is already the one that we go with, even if we are not thinking about it. Whatever the 'best' method or model is, it is because it is optimized for that specific problem. In the end,

Citations

Zaharatos, B. (2022-) Philosophy of Statistics.

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