MACS 3000: Perspectives on Computational Analysis
Problem Set 7

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1 Unit Testing in Python

Problem 1. Answer in smallest_factor.py The error in this function was not taking into account zero and negative values.

2 Test driven development

- Code in get_r.py

3 Watts (2014)

This paper's main argument is that sociologists rely on common sense more than they realized. Given that, the common sense treat subjective value judgments as objective facts, sociologists' explanations of social action have problems. The main problem is, according to the author, that these explanations mix the concepts of understandability and causality in ways that are not valid from a scientific point of view. He argues that the common sense reasoning permeates sociological theorizing through the same ancestor theory called "rationalizable action."The rationalizable action claims that one can explain social actions in terms of the intentions, beliefs, circumstances, and opportunities of the actors involved.

To explain the mix between understandability and causality the author uses the case of rational choice theory. Sociologist, psychologists, political scientists, and some economists heavily criticized rational choice models since they were introduced in the 1960s. Most of their critics show how these models relied on implausible and empirically invalid assumptions about the agent's behavior and preferences. For example, rational models assume that agents have exogenous, stable and consistent preferences, and as a result, they are always utility maximizers. Other critics claim rational choice models had low predicting power.

For example, some models made predictions that contradicted the empirical evidence. He argues that in the course of defending the plausibility and empirical validity of rational models, the rational choice theory shifted from a scientific to an empathetic way of explaining social actions. According to the author, their emphasis has also changed from prediction to understandability.

According to Watts the main pitfall of using commonsense theories of action is the confusion between understandability and causality in sociological theories. He argues that common sense notions are generally valid in everyday situations; and that this general everyday validity is easily confused with universal validity. In general, just because an explanation makes sense for some observed outcome, it does not mean it also corresponds to a generalizable causal mechanism.

In particular, the author describes three problems with rationalizable action as a causal explanation, the frame problem, the indeterminacy problem, and the outcome problem. The frame problem happens when we project ourselves into a particular situation trying to model it. When simulating, our brains fill in all the details, these details are essential and we end up treating them as defining features of the situation. In other words, when we think about a situation most of the critical details end up depending on ourselves and our view of the world, making them subjective. The indeterminacy problem happens when sociologists apply rationalizable action to explain collective behavior. In this approach, sociologists use representative agent intentions and beliefs to describe the actions of the collective. The problem is that , it has been shown, that the collective behavior of individuals can display effects that are not reducible to the individuals themselves. Finally, the outcome problem is in defining the outcome itself. How can we determine in what point in the future we are going to evaluate the consequences or the outcomes of some specific actions.

As a partial solution to these problems, Watts propose using methodologies where causal effects are identified. The golden standard to determine causal effects is the use of experimental methods, where the causal inference relies on the random assignment. Other ways that can be useful, but are not as straightforward as the experiments, are the natural experiments that exploit natural occurring randomness and laboratory experiments can also be useful to assert causal inference. Finally, the author also recommends out-of-sample testing as a method to improve the scientific validity of sociologists explanations.

In conclusion, this paper explains how the use of common sense making sociological theory mixed the concepts of causality and understandability in one. Nonetheless, it does not take into account the benefits that theoretical models have on causal inference. Theoretical models help us to avoid case-specific analysis in experimental settings and give us ground to work on theories that are more broadly applicable. It also benefits the causal inference on showing the possible mechanisms beforehand, so the researchers dont theorize over a specific sample of data. The most important part of having theoretical models is that those models give us a framework to ask empirical questions that are relevant to understand and explain social actions.