Exploratory Research is More Reliable Than Confirmatory Research

Clark Glymour

Ioannidis (2005) argued that most published research is false, and that "exploratory" research in which many hypotheses are assessed automatically is especially likely to produce false positive relations. Colquhoun (2014) with simulations estimates that 30 to 40% of positive results using the conventional .05 cutoff for rejection of a null hypothesis is false. Their explanation is that true relationships in a domain are rare and the selection of hypotheses to test is roughly independent of their truth, so most relationships tested will in fact be false. Conventional use of hypothesis tests, in other words, suffers from a base rate fallacy. I will show that the reverse is true for modern search methods for causal relations because: a. each hypothesis is tested or assessed multiple times; b. the methods are biased against positive results; c. systems in which true relationships are rare are an advantage for these methods. I will substantiate the claim with both empirical data and with simulations of data from systems with a thousand to a million variables that result in fewer than 5% false positive relationships and in which 90% or more of the true relationships are recovered.