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The Concept of Statistical Evidence: Historical Roots and Current Developments

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Abstract

One can argue that one of the main roles of the subject of statistics is to characterize what the evidence in collected data says about questions of scientific interest. There are two broad questions that we will refer to as the estimation question and the hypothesis assessment question. For estimation, the evidence in the data should determine a particular value of an object of interest together with a measure of the accuracy of the estimate, while for hypothesis assessment, the evidence in the data should provide evidence in favor of or against some hypothesized value of the object of interest together with a measure of the strength of the evidence. This will be referred to as the evidential approach to statistical reasoning which can be contrasted with the behavioristic or decision-theoretic approach where the notion of loss is introduced and the goal is to minimize expected losses. While the two approaches often lead to similar outcomes, this is not always the case and it is commonly argued that the evidential approach is more suited to scientific applications. This paper traces the history of the evidential approach and summarizes current developments.