

On the Significance of the Absolute Margin

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Abstract

Consider the hypothesis H that a defendant is guilty (a patient has condition C), and the evidence E that a majority of h out of n independent jurors (diagnostic tests) have voted for H and a minority of $k:=n-h$ against H . How likely is the majority verdict to be correct? By a formula of Condorcet, the probability that H is true given E depends only on each juror's competence and on the absolute margin between the majority and the minority $h-k$, but neither on the number n , nor on the proportion h/n . This paper reassesses that result and explores its implications. First, using the classical Condorcet jury model, I derive a more general version of Condorcet's formula, confirming the significance of the absolute margin, but showing that the probability that H is true given E depends also on an additional parameter: the prior probability that H is true. Second, I show that a related result holds when we consider not the degree of belief we attach to H given E , but the degree of support E gives to H . Third, I address the implications for the definition of special majority voting, a procedure used to capture the asymmetry between false positive and false negative decisions. I argue that the standard definition of special majority voting in terms of a required proportion of the jury is epistemically questionable, and that the classical Condorcet jury model leads to an alternative definition in terms of a required absolute margin between the majority and the minority. Finally, I show that the results on the significance of the absolute margin can be resisted if the so-called assumption of symmetrical juror competence is relaxed.

Keywords: Condorcet jury theorem, Bayes's theorem, voting, epistemic justification, hypothesis testing

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