Binary Collective Choice with Multiple Premises

Masaki Miyashita*

Abstract

Imagine a group of individuals facing with a complicated yes-no question whose truth value is logically driven from multiple premises. Their purpose is to make a correct group judgment on the question based on their individual judgments. There are two types of ways to aggregate individual judgments: "the premise driven way" (PDW) and "the conclusion driven way" (CDW). We analyze which way is superior to the other to find a correct answer. In our analysis, we introduce a Boolean algebraic approach to formulate a general class of such judgment aggregation problems. We find that if a group faces with a conjunctive decision problem, then PDW is more likely to avoid "false acquittance", while CDW is more likely to avoid "false conviction". In a disjunctive case, the converse of this result holds. However, as the size of a group goes to infinity, PDW ensures that the probability that the voting outcome is correct converges to one, while CDW does not.

Keywords: Social choice, Judgment aggregation, Doctrinal paradox, Condorcet jury theorem, Boolean algebra, Simple game.

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