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# The Distributional Rank Aggregation Problem, and an Axiomatic Analysis\*

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## Abstract

The rank aggregation problem has been studied in varied communities such as Theoretical Computer Science, Statistics, Information Retrieval and Social Welfare Theory. We introduce a variant of this problem we call distributional rank aggregation, where the ranking data is only available via the induced distribution over the set of all permutations. We provide a novel translation of the usual social welfare theory axioms to our setting, which has two consequences. First, this allows for a more quantitative characterization of these axioms, thus less prone to misinterpretation. Secondly, these quantitative characterizations lead to natural and novel relaxations of these axioms, which as we show, actually allow us to finessé celebrated impossibility results in social choice theory: providing rules that satisfy all the "impossible" axioms simultaneously, but with some slack. [Joint work with Adarsh Prasad and Harsh Pareek]