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Approximating Nash Social Welfare under Rado Valuations

Nash social welfare (NSW) is defined as the geometric mean of agents' valuations. We consider the problem of approximating maximum NSW while allocating indivisible items to agents. We present the first constant-factor approximation algorithm for the problem when agents have Rado valuations – a general class of valuation functions that arise from maximum cost independent matching problems, including as special cases assignment (OXS) valuations and weighted matroid rank functions. Our approach also extends to the asymmetric NSW (weighted geometric mean) under Rado valuations with approximation guarantees depending on the maximum weight.