

数理経済学会研究報告

早稲田大学経済学研究科 修士二年 横手康二

Title

A new linear basis of the game space and the Shapley value.

Abstract

The purpose of this research is to investigate the Shapley value in TU cooperative game theory from the viewpoint of linear algebra. We introduce a new basis of the vector space of TU cooperative games. The basis consists of simple games, that is, the worth of each coalition is equal to 0 or 1. The basis has two desirable properties related to the Shapley value. First, the basis induces the null space of the Shapley value. Second, when we express a game by a linear combination of the basis, the Shapley value coincides with the coefficients of some games in the basis. By using the new basis, we solve the inverse problem of the Shapley value, that is, we characterize the set of all games where the Shapley value is equal to a fixed vector. By slightly changing the definition of the new basis, we can investigate the weighted Shapley value as well.