OPTIMAL GROUPING OF STUDENTS IN COALITIONAL GAMES WITH THE SHAPLEY VALUE

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Received April 27, 2015

Abstract

In this paper, the classroom consists of three different kinds of students, and we discuss the problem how to divide these students into three person groups. The benefit of one group is the sum of three students' benefit by cooperation game. The benefit of each person is given by the Shapley value from the characteristic function we defined. Our goal is how to divide 18 students into subgroups with three persons to make the total benefit of the classroom maximal.

It is impossible to get the maximal score by using different 18 students having different potentials and six different coefficients for the combinations of three different levels of potentials. Especially, the number of combinations for dividing 18 students by 3 persons evenly is tremendous. Therefore, we can investigate some numerical examples under some limited conditions. Finally, we can obtain the theorem to make the total benefit of the classroom maximal under the limited condition.

The authors believe that this research can apply to group learning and the field of Education in the real life.

Key words and phrases. coalitional game, the Shapley value, characteristic function