An efficient algorithm for nucleolus and prekernel computation in some classes of TU-games

U. Faigle, Walter Kern, J. Kuipers

Discrete Mathematics and Mathematical Programming

Abstract

We consider classes of TU-games. We show that we can efficiently compute an allocation in the intersection of the prekernel and the least core of the game if we can efficiently compute the minimum excess for any given allocation. In the case where the prekernel of the game contains exactly one core vector, our algorithm computes the nucleolus of the game. This generalizes both a recent result by Kuipers on the computation of the nucleolus for convex games and a classical result by Megiddo on the nucleolus of standard tree games to classes of more general minimum cost spanning tree games. Our algorithm is based on the ellipsoid method and Maschler's scheme for approximating the prekernel.

Mathematics. The nucleolus is the largest structure in the nucleus of eukaryotic cells. It is best known as the site of ribosome biogenesis. Nucleoli also participate in the formation of signal recognition particles and play a role in the cell's response to stress. Nucleoli are made of proteins, DNA and RNA and form around specific chromosomal regions called nucleolar organizing regions. Malfunction of nucleoli can be the cause of several human conditions called "nucleolopathies" and the nucleolus is being

Some of the other main components of a nucleus include: Phospholipid bilayer membrane. Nucleoplasm. Nucleolus. Chromatic. In addition, the nucleoplasm helps cushion and thus protect the nucleolus and chromosomes while also helping maintain the general shape of the nucleus. Nucleolus. In the same way that the nucleus is the most prominent organelle of the cell, the nucleolus is the most prominent structure of the nucleus. * In some organisms, the nucleus contains as many as four nucleoli. Chromosomes. In the nucleus, chromosomes are thread-like structures made up of strands of DNA and the histone proteins. Main parts of the chromosome include: Kinetochores. Telomeres. Chromatids (each of which consists of the p and q arm). We propose an algorithm for finding the integer nucleolus of any directed simple game with a nonempty integer imputation set. The algorithm supports the parallel execution of multiple threads in a computer application. We also consider the integer prenucleolus and the class of directed generalized simple games. We study the class of directed simple games, assuming that only integer solutions are admitted; i.e., the players share a resource that comes in discrete units. We show that the integer nucleolus—if nonempty—of such a game is composed of the images of a particular payoff vector under all symmetries of the game. possess some common attributes, beyond the property that they all minimize \( \theta \) lexicographically. A complementary practical question is how to compute. \( \nu(\Gamma) \).