AMMCS

Paper ID: CS305

Asteroid Mining Model Based on Global Equity

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Introduction

Asteroid mining is a resource-based industry filled with potential. Human beings can safely bring their valuable resources back to the earth to relieve the tension of the earth's resources. The issue of equity distribution of benefits has been considered to be solved nowadays to predict and guide a harmony and balance development of the outer field. Prior to our work, there have been some discussions on the topic of specific resource mining[1,2]. In the process of improving the international legal order for the distribution of rights and interests in the development of outer space resources in the future, the international community may consider: Under the guidance of the concept of "a community with a shared future for mankind[3-6]", by establishing the right to preferential use of outer space resources, all countries will be relieved Disputes over the initial allocation of outer space resources; on the other hand, the parallel development system can be introduced and promote the sharing of non-monetary benefits.

In this paper, we put forward a kind of global equity model based on the previous dialectical thinking, which take every country's comprehensive caliber into consideration and provide a quantified evaluation mechanism to distribute resources and opportunities from asteroid mining.

Method & Application

Method

1. Improved Calculation of Vertical Distance
2. TOPSIS
3. Analytic Hierarchy Process
4. Vehicle distribution model based on Integer planning model

Application

Global equity is a concept that is complicated and hard to quantify. Combined with Maslow. A.H.'s Hierarchy of Human Needs theory, resources and opportunities can be embodied into physiological security needs, social needs and self-actualization needs. Physiology and security are material needs, while society and self-realization are spiritual needs. If we want to define an equity world, it cannot be separated from these needs. After searching the related information, the indicators selected in this paper are GDP per person employed, life expectancy at birth, secondary school enrollment rate and electricity access rate, and an equity evaluation model is established to measure the global equity coefficient with these four indicators. In addition, AHP refers to taking a complex multi-objective decision-making problem as a system, decomposing the objective into multiple objectives or criteria, then decomposing it into several levels of multiple indicators, calculating the single-level ranking (weight) through the fuzzy quantitative method of qualitative indicators, and ranking as a systematic approach to target (multi-index), multi-scheme optimization decision-making.

Conclusion

This paper disassembles the definition of global fairness, quantifies and builds a global fairness index model based on Maslow's demand theory, which is simple and easy to generalise. In addition, the multiple models constructed in this paper are used in the simulation and prediction at the same time to ensure the integrity and reliability of the results. The formula provided in this paper is customizable, which is convenient for experts and scholars to improve it according to the actual situation in the future. What's more, we simulate the evolution of the Standard World Model's equity index over the next hundred years. Obviously, under the maintenance of the equity guarantee fund, all the national equity indices in the Standard World Model are rising steadily, and the lower the starting point, the more obvious the increase in the equity indices of countries.

Reference

[1] Anderson SW, Christensen K, LaManna J. The development of natural resources in outer space[J]. Journal of Energy & Natural Resources Law, 2019, 37: 227-258.

[2] Su J. Legality of unilateral exploitation of space resources under international law[J]. International and Comparative Law Quarterly, 2017, 66: 991-1008.

[3] Liu T. A nonlinear multigrid method for inverse problem in the multiphase porous media flow[J]. Applied Mathematics and Computation, 2018, 320: 271-281.

[4] Liu T, Xue R, Liu C, Qi Y. A regularization homotopy strategy for the constrained parameter inversion of partial differential equations[J]. Entropy, 2021, 23: 1480.

[5] Liu T. A multigrid-homotopy method for nonlinear inverse problems[J]. Computers & Mathematics with Applications, 2020, 79(06): 1706-1717.

[6] Liu T. A wavelet multiscale-homotopy method for the parameter identification problem of partial differential equations[J]. Computers & Mathematics with Applications, 2016, 71: 1519-1523.