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Graphical Theoretical Construction of Discrete time Share Price Paths from Matroid

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Abstract : The lessons from the 2007-09 global financial crisis have driven scientific research, which considers the design of new methodologies and financial models in the global market. The quantum mechanics approach was introduced in the unpredictable stock market modeling. One famous quantum tool is Feynman path integral method, which was used to model insurance risk by Tamturk and Utev and adapted to formalize the path-dependent option pricing by Hao and Utev. The research is based on the path-dependent calculation method, which is motivated by the Feynman path integral method. The path calculation can be studied in two ways, one way is to label, and the other is computational. Labeling is a part of the representation of objects, and generating functions can provide many different ways of representing share price paths. In this paper, the recent works on graphical theoretical construction of individual share price path via matroid is presented. Firstly, a study is done on the knowledge of matroid, relationship between lattice path matroid and Tutte polynomials and ways to connect points in the lattice path matroid and Tutte polynomials is suggested. Secondly, It is found that a general binary tree can be validly constructed from a connected lattice path matroid rather than general lattice path matroid. Lastly, it is suggested that there is a way to represent share price paths via a general binary tree, and an algorithm is developed to construct share price paths from general binary trees. A relationship is also provided between lattice integer points and Tutte polynomials of a transversal matroid. Use this way of connection together with the algorithm, a share price path can be constructed from a given connected lattice path matroid.

Keywords : combinatorial construction, graphical representation, matroid, path calculation, share price, Tutte polynomial
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