Options are traded actively on many exchanges across the world. Especially, some complex options such as multi-dimensional Asian options are much more widely used in the financial market. The price of an option need to be computed to help the investors in deciding if it is worthwhile entering a particular contract. Pricing multi-dimensional American-style Asian options is difficult because it involves early exercise possibilities, multi-dimensional asset management, as well as the path-dependency issues.

In this thesis, we have developed a parallel algorithm for pricing the American-style Asian options. We have then improved this algorithm by introducing a mathematical transformation to handle the interrelationship among the various underlying assets as well as to reduce the computational cost incurred due to the multi-dimensionality. We show that the algorithm provides quicker and accurate solutions.

We have tested the new algorithm on a 16 nodes distributed computing system and compared it with the parallel algorithm for American-style plain options. We have also provided analytical results for the computation and communication complexities of the parallel algorithm. The mathematical transformation is proved to be essential through our experimental results. Compared with the parallel algorithm for pricing American-style plain options, the algorithm for pricing an American-style Asian option offers a better problem for parallel computing because of its large workload for computations.