Abstract :

In finance, the portfolio optimization problem made a significant progress after Markowitz's seminal who develop the modern portfolio theory, which stipulates that a portfolio selection problem consists of minimizing the risk represented by the variance and maximizing the ex- pected return. In this work, a bi-objective mixed integer quadratic model is presented, holding notice of real world constraints, which are the constraints on number of selected assets, called "cardinality constraints". For its resolution, we propose an exact method based on the steepest gradient and a new exploration strategy of problems generated at each step. The main idea of this method is to compute the maximum point by considering exclusively the return function obtained by solving a Mixed Integer Linear problem (MILP). Then, after adding a cut effe- ciency that takes into account the risk function, the augmented problem must be solved until finding the minimum of the risk function. This proposed method is validate using some major market indices, such as the Hang Seng, DAX100, FTSE 100, S&P 100, Nikkei, S&P 500 and Nasdaq and by using real data sets involving up to 2196 assets. The results show that this method finds Pareto optimal solutions in a reasonable time.