FAST ALGORITHM FOR FINDING LATTICE SUBSPACES IN $\mathbb{R}^n$ AND ITS IMPLEMENTATION

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There are known necessary and sufficient conditions for a subspace of $\mathbb{R}^m$ to be lattice-ordered. Let $Y = \{y_1,...,y_m\}$ and y_i are rows of the matrix X. A subspace $\langle X \rangle$ of linear space generated by the set X of *n* linearly independent positive vectors is lattice-ordered if and only the set X admits a fundamental set of indices I, which means that the subset $Y_i \subseteq Y$ of vectors indexed by I is linearly independent, and every vector from $Y \setminus Y_I$ is a nonnegative linear combination of vectors form Y_I.

It is possible to prove that the minimum-cost insured portfolio exists if and only if the linear space generated by the corresponding financial instruments is lattice-ordered.

In the literature there are known algorithms with exponential complexity that determine if a given subspace is lattice ordered.

In this thesis a polynomial time algorithm (serial and parallel) as well as its computer implementation will be presented. The method can be applied in economics as well as in the theory of vector lattices.