Research (What is it about?)	**Effective solvable classes for integer programming**
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We find (The result)	By analyzing the range of permissible values of integer linear programming (ILP) problem the effectively solvable ILP task subclasses are identified and estimates of their complexity are made. The algorithms of integer points search in polyhedra are developed.
Abstract	The ILP task is the optimization problem: maximize/minimize $\sum_{j=1}^{n} c_j x_j$, subject to: $\sum_{j=1}^{n} a_{ij} x_j = b_j \ (i = 1,2,\dots,m)$, x_j integer, $x_j \geq 0 \ (j = 1,2,\dots,n)$, for some or all j. The ILP problem is one of classically tough problems of nonlinear programming (NP). There is no single effective technique for solving integer programs. If well known hypothesis P≠NP is true, that techniques are absent at all. Instead, a number of procedures have been developed, and the performance of any particular technique appears to be highly problem-dependent. Methods to date can be classified broadly as following one of three approaches: i) enumeration techniques, including the branch-and-bound procedure; ii) cutting-plane techniques; and iii) group-theoretic techniques. It makes one to look the effectively solvable subclasses ILP. By analyzing the set of ***integer*** points in polyhedra the effectively solvable subclasses of ILP tasks are identified and the estimates of their complexity (the length of training in a class of threshold functions of *k*-digit logic with *n* variables) are fulfilled. The latter is determined by the number or ***irreducible*** points (points that can't be presented as integer points half-sums) in convex *n*-dimension polyhedra. If convex *n*-dimension polyhedron has enough large width, it contains at least n+1 integer points it is proved. The algorithm to search of those points is developed. Subexponential algorithm for ILP task in polyhedra is constructed. The conditions to solve this task at a polynomial time is found.

Representative articles 2016-2017, quartiles	1. *Chirkov A.Yu., Zolotykh N.Yu.* On the number of irreducible points in polyhedra. Graphs Combinat. **32**(5), 1789-1803 (2016).	Q4
	2. *Gribanov D., Veselov S.* On integer programming with bounded determinants. Optimization Lett. **10**(6), 1169–1177 (2016).	Q2,Q3
	3. *Gribanov D., Chirkov A.* The width and integer optimization on simplices with bounded minors of the constraint matrices. Optimization Lett. **10**(6), 1179–1189 (2016).	Q2,Q3
	Q-index (Qi) of the result	**2**

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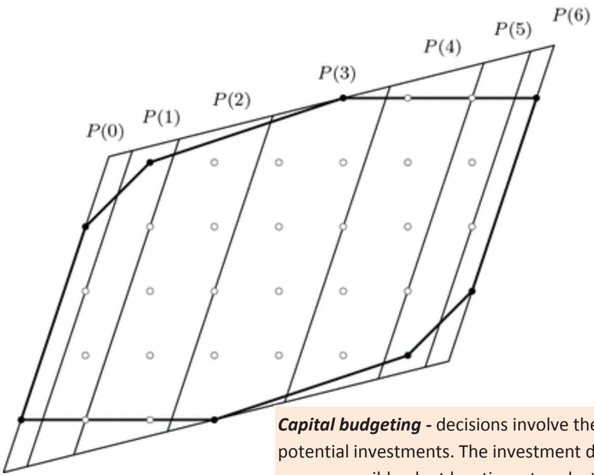

The search of irreducible points: all of them (solid black) are vertices of the convex hull of integer points (circles) in the parallelepiped. Each parallelepiped $P(0)$, $P(3)$, $P(6)$ contains 2 irreducible points. Each $P(1)$, $P(5)$ contains 1 irreducible point. $P(2)$ and $P(4)$ have no irreducible points.

n-dimensional ILP models in polyhedral. One can consider:

Capital budgeting - decisions involve the selection of a number of potential investments. The investment decisions might be to choose among possible plant locations, to select a configuration of capital equipment, or to settle upon a set of research-and-development projects.

Warehouse Location - decisions must be made about tradeoffs between transportation costs and costs for operating distribution centers.

Computational Biology. Some biological problems of importance can be modeled in a way that allows a solution in seconds on a laptop, while more common models require days, weeks or months of computation on large clusters: Gene interaction or gene influence networks and graphs, Protein-Protein interaction networks, Brain pathway graphs – connectome …