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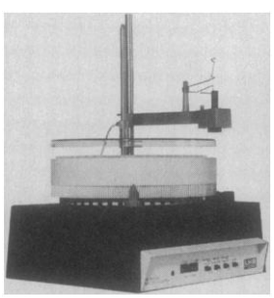
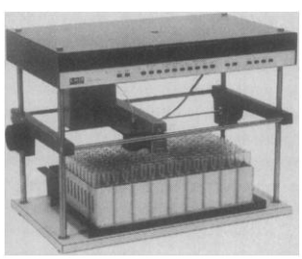
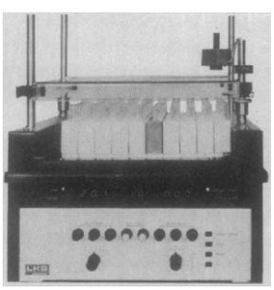


RediRac: portable—economical—variable tube size



MultiRac: overhead microprocessor—programmable—solvent resistant



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LETTERS

Contribution to the Ellipsoid Algorithm

The recently publicized polynomial time ellipsoid algorithm for linear programming has generated much excitement and activity among both researchers and press (News and Comment, 2 Nov. 1979, p. 545). We wish to add some historical remarks concerning the genesis of these ideas.

The Khachian paper (*1*) refers to earlier works of Shor (*2*) and of Judin and Nemirovsky (*3*). However, because the paper by Judin and Nemirovsky has not yet been translated, the full significance of their work and its major contribution to the polynomial time solution of the linear programming problem is only now becoming apparent. One of our aims in this letter is to stimulate the translation of this and other of Nemirovsky's works.

We summarize here the linear programming problem and the contribution of the papers by Nemirovsky and the head of his division, Judin, to its solution.

The problem is to find a solution with a given accuracy of a system of linear real inequalities or to determine its unsolvability. In the discrete version the coefficients are rational, and it is required to determine the exact solvability. As is well known, this is equivalent to the approximate solvability with a high enough accuracy. The required accuracy is easy to find, since the set of solutions forms a polyhedron, whose vertices are rationally expressible in terms of the coefficients of the system. Judin and Nemirovsky's 1976 paper (*3*) gives the ellipsoid algorithm for solving the continuous version with an *explicitly* stated polynomial upper bound on the number of steps. The formulation of the results is suitable not only for linear but also for convex inequalities. The paper refers to an earlier paper of Shor (*2*); however, Shor's gradient descent method was not sufficiently developed or specified to provide a polynomial upper bound. The main contribution of Khachian's paper (*1*) was a reformulation of Judin and Nemirovsky's paper for the discrete case.

Since the publication of Khachian's paper, and its explication by Gács and Lovász (*4*), many researchers have proposed improvements of the ellipsoid algorithm. We note, however, that improvements were already presented (*3*, *5*) (sphere method, dimension reduction, and so forth). We believe this parallelism

shows how unfortunate it is that Nemirovsky's papers are unknown and untranslated. Perhaps this is because Nemirovsky does not have the advantage of working in a well-known institution, nor of having these papers published by well-known journals.

Nemirovsky is a scientist of the highest caliber whose major field is pure mathematics, in particular, functional analysis. We urge our colleagues to seek out and translate his papers and books.

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4. P. Gács and L. Lovász, "Khachian's algorithm for linear programming," distributed in preliminary form at the 10th International Symposium on Mathematical Programming in Montreal, Canada, 27 to 31 August 1979; available as Report CS 750, Computer Science Department, Stanford University, Stanford, Calif.
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Confidentiality: Rights and Responsibilities

The article by Gordis and Gold on privacy and confidentiality in medical records research (11 Jan., p. 153) is an excellent statement about the rights and obligations of scientists in a search for an equitable balance between the information needs of the biomedical research community and the individual rights of patients and research subjects to confidentiality and privacy. It is made even more valuable by its original presentation as congressional testimony on behalf of the professional societies whose members' activities are directly affected by such ethical and legal issues, and as such it is a noteworthy public contribution by these societies.

The article does not mention, however, a new policy question that has emerged in the context of balancing researchers' rights with the public's right

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