ALGEBRA SEMINAR

Solving linear Diophantine systems via Polyhedral Omega and applications in optimization

By

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Abstract: We Polyhedral Omega (PO) is an algorithm for solving linear Diophantine systems, i.e., for computing a multivariate rational function representation of the set of all non-negative integer solutions to a system of linear equations and inequalities. PO combines methods from partition analysis with methods from polyhedral geometry. In particular, we combine MacMahon's iterative approach based on the Omega operator and explicit formulas for its evaluation with geometric tools such as Brion's decompositions and Barvinok's short rational function representations. This synthesis of ideas makes Polyhedral Omega the simplest algorithm for solving linear Diophantine systems available to date. Given a rational generating function representation of a feasible region defined by linear equations and inequalities, there are different ways of obtaining the optimum with respect to some linear functional.
One advantage of PO is that it can obtain a decomposition of the feasible region to simplicial cones (called symbolic cones), without resorting to rational function representations. After presenting Polyhedral Omega, we will discuss possible applications in optimization.

Date: December 11, 2019 Wednesday
Time: 10:40 – 11:50
Place: SA141 Mathematics Seminar Room

* Simit and cream cheese will be served before the talk. All are most cordially invited.