

AGCO Seminar

Speaker: Arturo Merino, TU, Berlin

Title: From Combinatorial Optimization to Combinatorial Generation.

Abstract: We propose a new simple general approach for combinatorial generation. Given some binary strings $X \subseteq \{0,1\}^n$, our approach consists of greedily computing a Hamilton path in a polytope with X as vertices, namely $\text{conv}(X)$. Our main result shows that this approach works for all $X \subseteq \{0,1\}^n$ and is efficient whenever optimization over X can be efficiently solved, showing an unexplored relation between combinatorial optimization and generation. More specifically, if we can solve certain linear optimization problems for X in time $O(T)$, we can compute a Hamilton path in $\text{conv}(X)$ in roughly $O(T \cdot \log(n))$ time per vertex.

As a consequence, we obtain new efficient algorithms for combinatorial generation problems that can be binary encoded, like spanning tree generation, 0/1 vertex enumeration, and perfect matching generation. Furthermore, consecutive objects visited by our generation algorithms differ only in a local operation, like an edge exchange in the case of spanning trees or an alternating cycle exchange in the case of perfect matchings.

This is joint work with Torsten Mütze.

When: November 16, 15:00 hrs.

Where: Sala de Seminario John Von Neuman, CMM, Beauchef 851, Torre Norte, Piso 7.

