On Robust Selection Problems

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Robust optimisation considers problems that are affected by uncertain data: How can we find a solution that performs well, even if things don't go quite as planned? Typically, adding robustness to a problem makes it harder to solve.

The selection problem is maybe the simplest non-trivial combinatorial optimisation problem. Given a set of n items, the task is to choose p items that maximise some profit. Being that simple, it is an interesting object of study for complexity in robust optimisation, as its robust counterparts sometimes turn out to become NP-hard, sometimes not.

In this talk I present some of the complexity results in this area, which can be surprising. Along the way, we develop an overview on different approaches to robust optimisation, and see what they mean for the selection problem.