

# First-order representations for integer programming

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## **Abstract**

Modelling languages such as ZIMPL are tremendously useful ways of compactly writing down integer programs with large numbers of variables and constraints. A ZIMPL statement such as  $\forall a \in A, \forall b \in B : x[a] \leq x[b]$  expresses a (linear) constraint for each pair  $(a, b)$ . But prior to sending the problem to a solver such an expression will be “propositionalised” into a (possibly large) set of ground instances of the constraint. In this talk I aim to explore whether this “grounding out” can be avoided, and whether there is any advantage in so doing. I will be discussing cutting plane algorithms (as a representation of sets of constraints) and column generation algorithms (as a representation of sets of variables). My talk will not assume any prior knowledge of integer programming.