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ERRATUM

Erratum to: MIR closures of polyhedral sets

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In Section 3.3 of the paper [3], we compare our nonlinear separation model (MIR-SEP) for MIR cuts with the one for split cuts (PMILP) presented in Balas and Saxena [1] and show that (Lemma 9) they are equivalent. We then present a numerical example to show that the linearized separation models are not equivalent and make the following claim without a proof:

"The Balas/Saxena model PMILP for this example (or more precisely, the deparametrized model MILP(θ)) is infeasible unless the parameter θ is chosen to be exactly 0.31."

This claim is incorrect (as pointed out to us by Balas and Saxena) and contains two errors. The first is that Balas and Saxena [1] assume that all variables are non-negative, whereas the example in our paper contains a free variable. Secondly, for any problem in the correct format (including the one obtained by replacing the free variable in our example by two non-negative variables) MILP(θ) is feasible for all $\theta \in (0, 1)$.

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However, it is still true that the linearized separation models are not equivalent. More precisely, it is possible to show the following claim. For the set $Q = \{x_1 \in \mathbb{R},\ x_2, x_3 \in \mathbb{Z} : x_1 + x_2 - x_3 \geq 0.31,\ x_1, x_2, x_3 \geq 0\}$, the separation model MILP(θ) in [1] cannot produce the single cut that defines the MIR closure of Q unless θ is chosen to be one of 0.31 or $1 - 0.31 = 0.69$. In other words, the MIR cut $x_1 + 0.31(x_2 - x_3) \geq 0.31$ is not a feasible solution to MILP(θ) if $\theta \notin \{0.31, 1 - 0.31\}$. This claim remains true if 0.31 is replaced by any number in (0, 1). Therefore, the solution set of Appx-MIR-Sep with, say, $k = 2$ is not contained in the union of the solution sets of MILP(0), MILP(1/4), and MILP(1/2).

Note that Balas and Saxena do not use the cut generated by MILP(θ) directly, but instead use the disjunction obtained by MILP(θ) to generate a second cut via a linear program that uses a special normalization constraint. For the example above, the cut generated by this second LP is then strengthened [2] using the Balas-Jeroslow monoidal strengthening technique to obtain the desired MIR cut.

References

1. Balas, E., Saxena, A.: Optimizing over the split closure. Math. Program. Ser. A **113**, 219–240 (2008)
2. Balas, E.: personal communication (2009)
3. Dash, S., Günlük, O., Lodi, A.: On the MIR closure of polyhedral sets. Math. Program. Ser. A **121**, 33–60 (2010)