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# Knowledge Intensive Learning of Credal Networks (Supplementary Material)

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## A OTHER FORMS OF KNOWLEDGE

While we present the specific case of monotonic influence statements (MISs) in the main paper, our framework is sufficiently flexible to accommodate any form of knowledge that can be encoded as differentiable functions.

**Linear inequality.** Forms of knowledge such as synergistic influence statements (SISs) described by Yang et al. (2014) can be encoded as linear inequality constraints similar to the MISs described in the main paper.

**Linear equality.** Forms of knowledge such as context-specific independence relations (CSI Boutilier et al. [1996]) can be encoded as linear equality constraints. Consider a variable  $Y$  having three parents  $X_1, X_2, X_3$ . The CSI that  $Y \perp\!\!\!\perp X_2 \mid X_3 = 1$  is equivalent to the constraint

$$P(Y \mid X_1, X_2 = x_2, X_3 = 1) = P(Y \mid X_1, X_2 = x_2, X_3 = 1) \forall x_2 \in \text{Domain}(X_2)$$

and can be encoded by adding a penalty term similar to the one in equation (10).

## References

- Craig Boutilier, Nir Friedman, Moises Goldszmidt, and Daphne Koller. Context-specific independence in bayesian networks. In *UAI*, 1996.
- Shuo Yang, Tushar Khot, Kristian Kersting, Gautam Kunapuli, Kris Hauser, and Sriraam Natarajan. Learning from imbalanced data in relational domains: A soft margin approach. In *ICDM*, 2014.