A Solvers Used in the Experiments

In the table below we give an overview of WMI solvers used in our empirical analysis. For the PA [Morettin et al., 2017] and the PRAiSE [De Salvo Braz et al., 2016] solvers we used the original implementation, and we reimplemented the BR [Kolb et al., 2018] and the Symbo (listed as XSDD(PSI)) [Zuidberg Dos Martires et al., 2019] algorithms. We indicate whether the solvers are based on knowledge compilation and whether the integration is performed through symbolic integration. All listed solvers perform exact WMI inference with the exception of XSDD(Sampling), which approximates the integration step with Monte Carlo integration through rejection sampling.

Name	**KC**	**Symbolic**	**Implementation**
PA			Original
PRAiSE		✓	Original
BR	✓	✓	Reimplemented
XSDD(Latte)	✓		New
XSDD(Sampling)	✓		New
XSDD(PSI)	✓	✓	Reimplemented
XSDD(BR)	✓	✓	New
F-XSDD(PSI)	✓	✓	New
F-XSDD(BR)	✓	✓	New

B Extended Running Example

In this section we extend Example 1 in the paper in order to describe in more detail our factorized solving approach F-XSDD. Therefore, recall the SMT formula given from Example 1:

$$\begin{aligned} x{>}0 \wedge \\ x{<}1 \wedge \\ (y{<}1) \vee ((x{>}y) \wedge \\ y{>}1/2 \end{aligned} \tag{22}$$

Abstracting the atomic SMT formulas we can compile this formula into the XSDD seen in Figure 4.

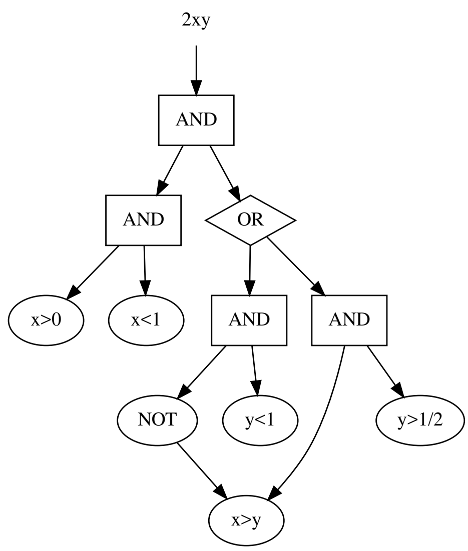

Figure 4: The SMT formula in Equation 22 for weight $2xy$ from Example 1 compiled into an equivalent XSDD.

We are now able to compute the weighted model integral of the problem given in Example 1 by evaluating the XSDD and integration out the resulting symbolic expression:

$$\int \Big([\![x{>}0]\!][\![x{<}1]\!][\![y{<}1]\!][\![x \geq y]\!] + [\![x{>}0]\!][\![x{<}1]\!][\![y{>}1/2]\!][\![x{>}y]\!] \Big) 2xydxdy$$

To solve this integral efficiently we would like to push the integration inside the evaluation of the XSDD and reuse intermediate integration steps. This process of pushing-in the integration over variables is visualized in Figure 5.

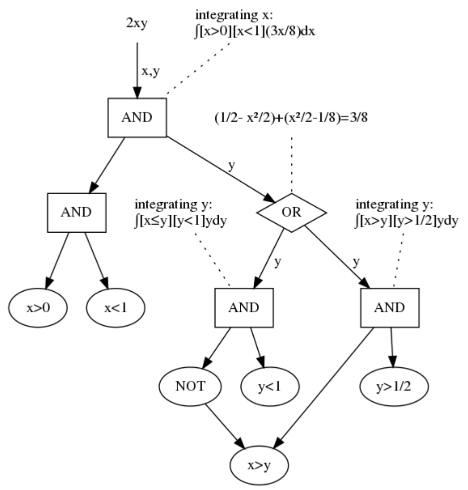

Figure 5: We show how integration variables can be pushed inside the XSDD, to integrate subexpressions separately.

Evaluating the XSDD depicted in Figure 5 results in computing the following integral:

$$2 \int_{(x>0)\wedge(x<1)} \left(\int_{(y<1)\wedge(x\geq y)} ydy + \int_{(y>1/2)\wedge(x>y)} ydy \right) xdx$$

We see that the atomic formulas in the SMT($\mathcal{LRA}$) formula in Equation 3 become the integration bounds over which to integrate the weight function.