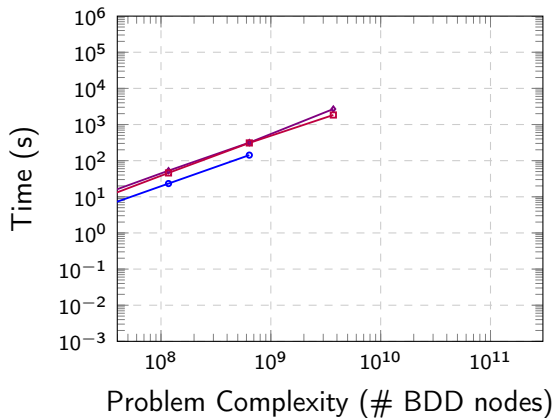


Predicting Memory Demands of BDD Operations using Maximum Graph Cuts

Steffan Christ Sølvesten and Jaco van de Pol

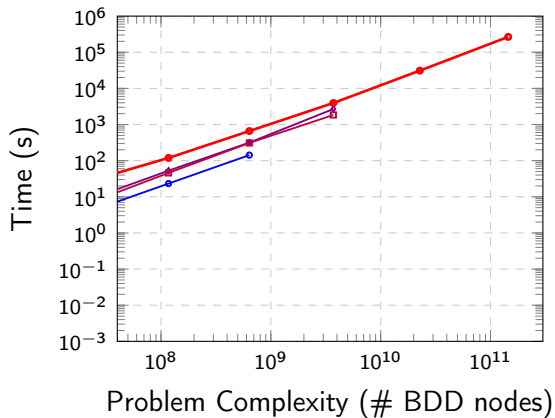
ATVA 2023





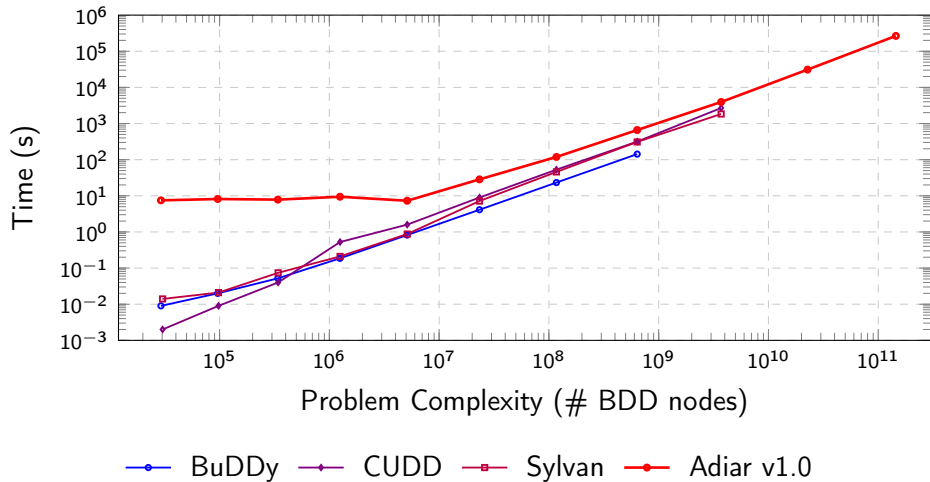
—●— BuDDy —◆— CUDD —■— Sylvan —●— Adiar v1.0

Running Time to solve N -Queens problems.

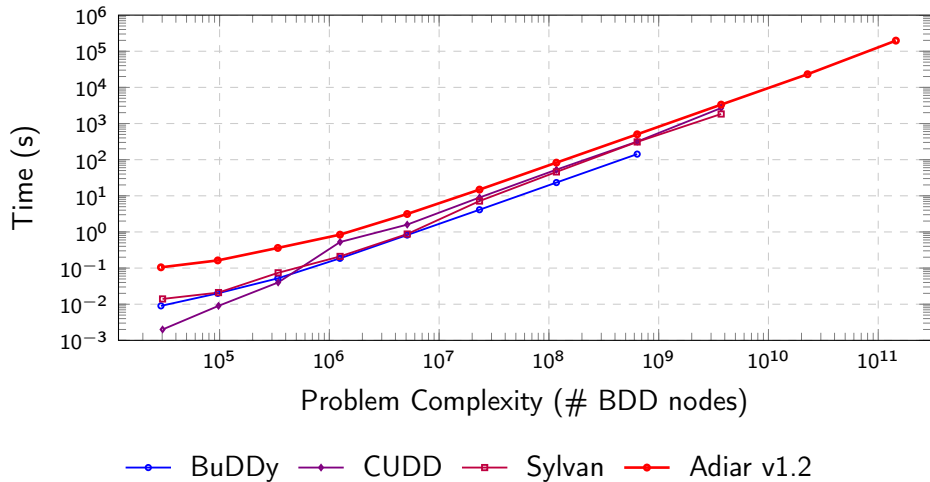


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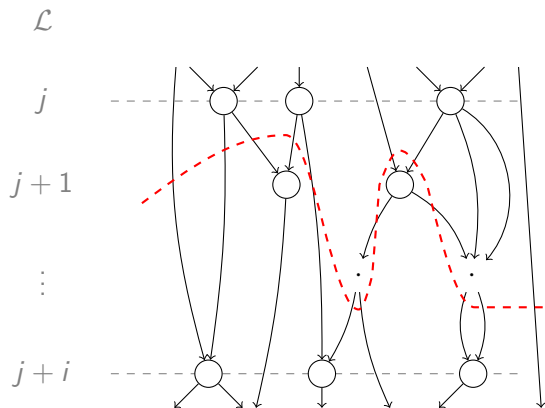








i -level cut



i -level cut



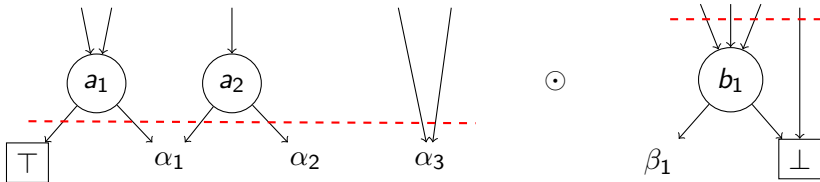
Lemma (Sølvsten, Van de Pol 2023)
The maximum i -level cut problem is in P for $i \in \{1, 2\}$.

Theorem (Lampis, Kaouri, Mitsou 2011)
The maximum i -level cut problem is NP-complete for $i \geq 4$.

Theorem (Sølvsten, Van de Pol 2023)

Given maximum 2-level cuts size C_f for f and C_g for g , the maximum 2-level cut for $f \odot g$ is less than or equal to $C_f \cdot C_g$.

Proof.

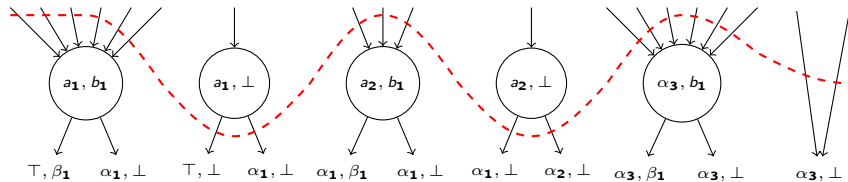


□

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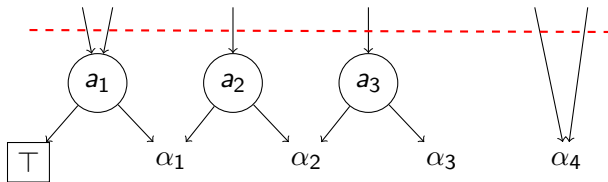
□

Lemma (Sølvsten, Van de Pol 2023)

The maximum 2-level cut for f is at most $\frac{3}{2}$ larger than its maximum 1-level cut.

Proof.

The maximum 1-level cut bounds the number of available in-going and out-going edges.



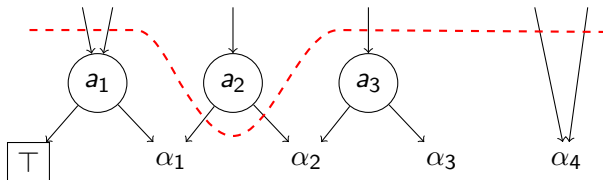
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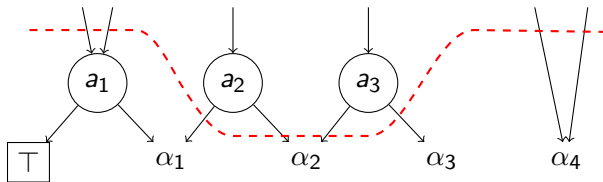
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□

Possible to process a

1.1 GiB BDD

with only

128 MiB Memory

Adiar v1.0 : 56.5 hours

Running time to verify the 15 smallest EPFL instances.

Adiar v1.0 : 56.5 hours

Adiar v1.2 : 4.0 hours (-93%)¹

Running time to verify the 15 smallest EPFL instances.

¹ 52.1 of these hours were saved on just verifying the `sin` circuit alone.

Steffan Christ Sølvesten

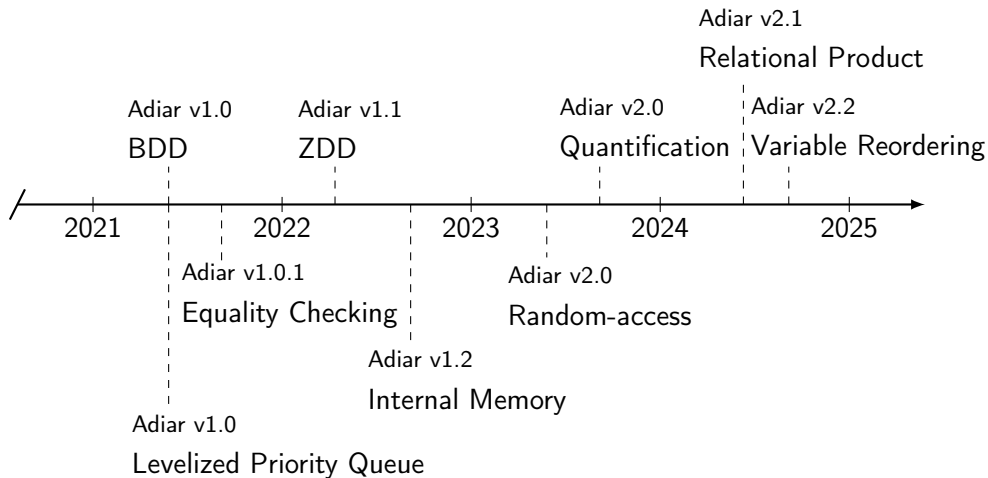
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Adiar

🔗 github.com/ssoelvsten/adiar

📖 ssoelvsten.github.io/adiar



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