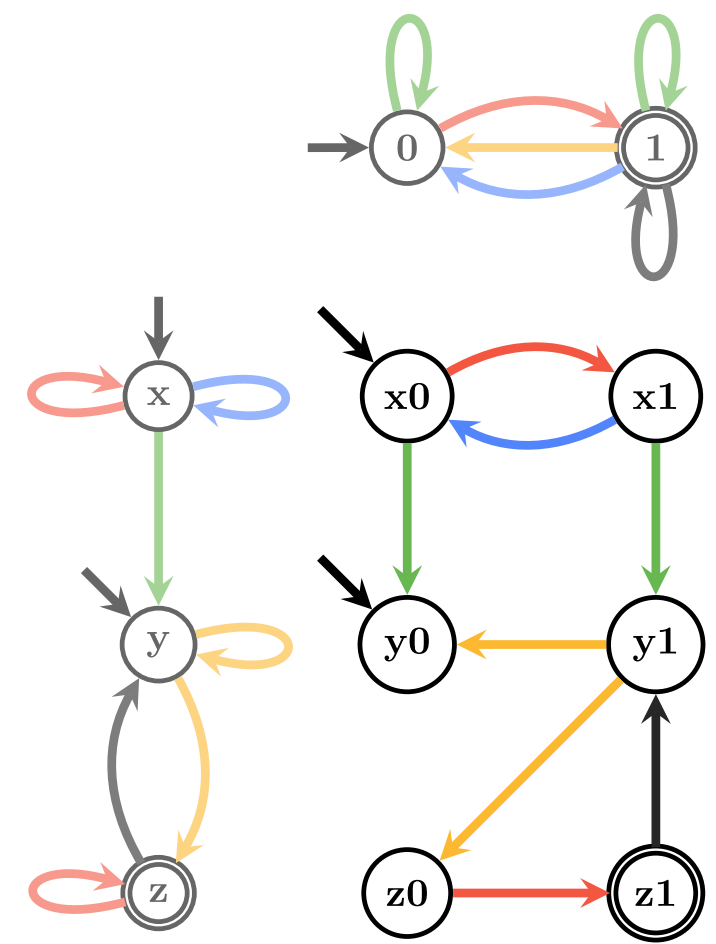


Pushing the limits of abstraction heuristics: WHICH PROBLEMS CAN (OR CANNOT) BE ABSTRACTED EFFICIENTLY?

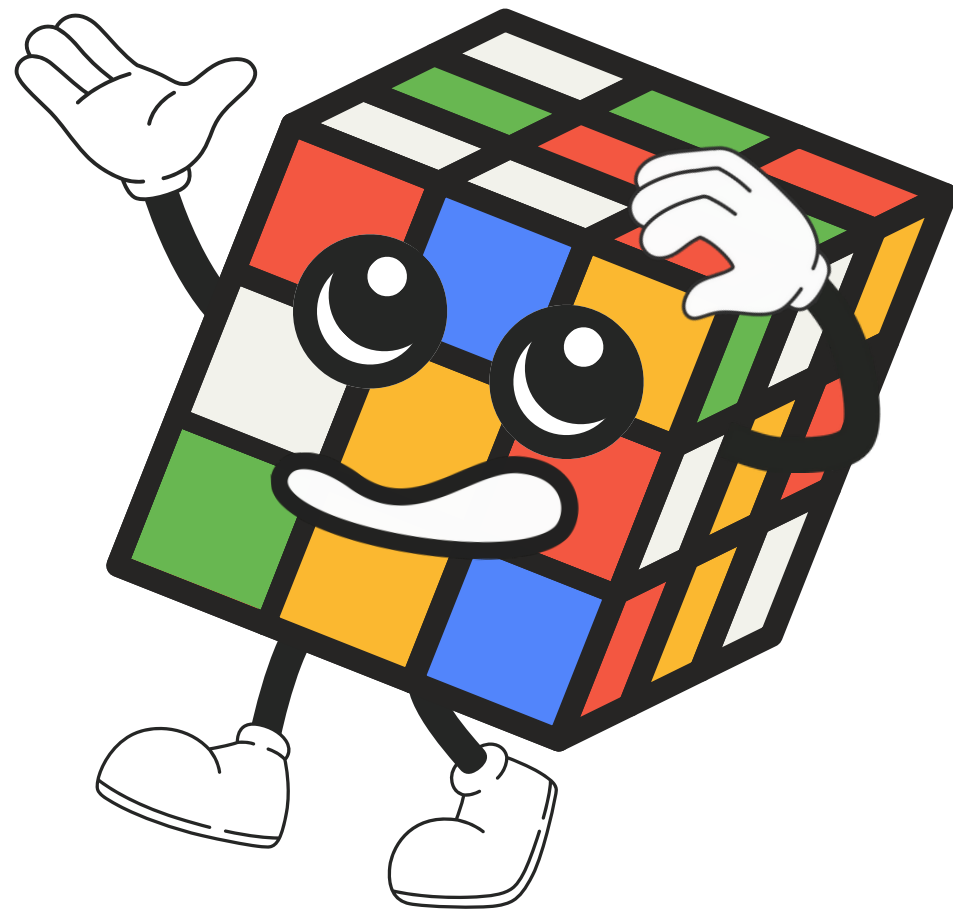


- ### Factored Tasks
- generalization of SAS⁺
 - **independent variables** but otherwise as general as possible
 - multiple initial states
 - disjunctive preconditions
 - conditional effects
 - angelic nondeterminism

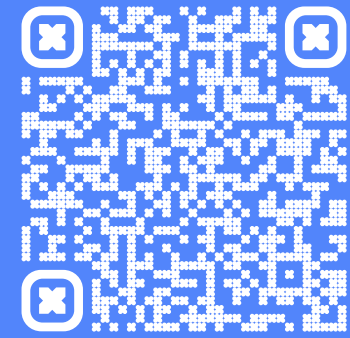
- ### Abstractions for Factored Tasks
- conservative** and **induced** abstractions
- projections / pattern databases^{T,I}
 - domain abstractions^{T,I}
 - Cartesian abstractions^{T,I}
 - merge-and-shrink abstractions^I
-
- our contribution: ^Ttheory ^Iimplementation

- ### Why Possible Efficiently?
- projection** and **domain abstraction**:
- syntactic \equiv semantic abstraction
- Cartesian CEGAR**:
- initial states
 - goal states
 - preconditions
 - postconditions
- } Cartesian sets

- ### What's Not Possible Efficiently?
- Consider projection on $\{V\}$ and operator o with general conditional effect:
- $$\varphi \triangleright (V := d')$$
- Does abstract transition $d \xrightarrow{o} d'$ exist?
- only if $\varphi|_{\{V=d\}}$ satisfiable
 - **NP-complete** already for φ in 3CNF



Abstraction Heuristics for Factored Tasks



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