Implementing Tableaux Using BDDs

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*Some content from slides by Rajeev Gore and Wikipedia.*
Propositional Logic

Formulae $\varphi$:

- $p_0, p_1, p_2 \ldots$ (atomic formula / variable)
- $\neg \varphi$ (negation)
- $\varphi \land \varphi$ (conjunction)
- $\varphi \lor \varphi$ (disjunction)
- $\varphi \Rightarrow \varphi$ (implication)
Modal Logic

Extends propositional logic with:

- □ φ (necessity)
- <> φ (possibility)

Deals with a set of possible worlds W, and a relation R between them, eg:

□ φ at w => φ at all R-successors of w.

<> φ at w => φ at at least one R-successor of w.
Tableaux

- Inference procedure, for determining whether a given set of formulae is satisfiable or not.
- Consists of four rules:
BDDs

- Binary Decision Diagrams
- Compact representation of a boolean function.
- \([ \text{Variable} : \text{Lo Hi}], [\text{True}], [\text{False}]\)
Research Question

- If we use BDDs to implement tableaux, how does its performance compare with other state of the art methods?

Questions?