Verifying the On-Line Help System of SIEMENS MR Tomographs using SAT

Consistency Checking of On-Line Documentation

- Modular products and modular on-line help system: Help packages (sets of HTML pages) are associated with propositional formulae that describe matching product configurations
- **Problem**: Is the on-line help system consistent (no help package overlaps) and complete (no missing packages)?
- Formulated as SAT problem, check validity of:

\[
\text{HelpReq} \land \text{ValidConf} \Rightarrow \bigvee_{p \in \text{HelpPackages}} \text{HelpProv}(p)
\]
\[
\text{HelpReq} \land \text{ValidConf} \Rightarrow \neg (\text{HelpProv}(p_1) \land \text{HelpProv}(p_2))
\]

Real-world problem with natural formulation as SAT.

Systematics of SAT Encoding and Consistency Check

- **Product Structure of MR Tomographs**
- **Propositional Encoding of Prod. Struct.**
- **Help Package Assignment in XML**
- **Propositional Encoding of Assignment**
- **SAT Solver**
- **Result of Consistency Check (Overlaps / Holes)**

Background: Product Configuration

Configuration deals with **modular, customer-adaptable** products:

» Which selections of components are admissible and make up a valid product (considering compatibility restrictions)?
» Which product matches a customer’s intention most closely?
» Impact on parts selection, production, (on-line) **documentation**, ...

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