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APPLY FUNCTIONAL MODELING TO CONSEQUENCE ANALYSIS IN SUPERVISION SYSTEMS

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AGENDA



- Introduction
- Consequence analysis and functional modeling
- Multilevel Flow Modeling (MFM)
- Rule-based tool development
- Implementation challenges
- Conclusion

INTRODUCTION



• PHD project

Funded together by DTU and IFE

• Period

March 2012 to March 2015

• Subject

Consequence Reasoning in MFM and Its Application in Operation Supportive Systems



CONSEQUENCE ANALYSIS

• Scope:



FUNCTIONAL MODELLING

• What – Definition

- Why Justification
 - Means-end concept
 - Goal-function representation of the process
- How Methodology

MULTILEVEL FLOW MODELING

MFM Concepts and MFM models



- Means-end and whole-part decomposition
- State dependency relations are generic
- Means-end relations
- Means-end patterns
- MFM patterns
- Potential path of event propagation, temporal information
- Domain: NPP, etc. [refs]



MFM REASONING

RULE-BASED SYSTEM

- Components of a typical rule-base system:
 - A user interface or other connection to the outside world through which the knowledge of the system is collected and the input and output signal can be sent.
 - A knowledge base that stores the system information and conditions.
 - A rule base contains a set of rules, which is a specific type of knowledge base.
 - An inference engine or semantic reasoner, which infers information or takes action based on the interaction of knowledge base and the rule base.



RULE-BASED SYSTEM



Fig2. Reasoning System Architecture for Consequence Analysis

RULE-BASED SYSTEM





CHALLENGES



- Modelling challenge:
 - Represent operation modes, barriers, control structures, etc.
 - [Refs]
- Reasoning strategy challenge
 - Inference propagation and validation
- Integration challenge
 - Interface design with other operation support systems
- Data interpretation challenge
 - Structure-role-function mapping
- Visualization challenge
 - Knowledge representation and display



INFERENCE PROPAGATION

Identify propagation loops



CONCLUSION



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THANK YOU FOR YOUR ATTENTION!