Towards Good Enough Testing: A Cognitive Oriented Approach Applied to Infotainment Systems

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Outline

Motivation

Idea

Conception and Realization

Summary and Conclusion

Future Work
Test System that can “Partially” Imitate the Human Testers
Reasonable Portion of the Workload is Shifted to the Test System Itself
Significant Reduction in the Time and Cost
Test Efficiency is “not” Sacrificed
Outline

Motivation

Idea

Conception and Realization

Summary and Conclusion

Future Work

Idea

- Human-Machine-Interaction (HMI)
  - Perception
  - Action

- Self-Learning Test System
  - HMI Observation
  - HMI Modeling
  - HMI Storing

Idea


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Outline

Self-Learning Module
Optimization Module
Generalization Module
Self-Learning (a): Learning by Observing Human Testers „HMI-Modeling“

- Real World Scene is Modeled as a Situation
- Situation Consists of Characteristics
- An Action is Modeled by an Operator
- Each Test Case is Defined as an Experience

Human-Machine-Interaction (HMI)

Initial Situation ($S_I$)

Final Situation ($S_F$)

Experience

Online-Observation

HMI-Modeling

Knowledge Base

[Soëffer 2003]


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Self-Learning (a): Learning by Observing Human Testers „Example“

Self-Learning (b): Learning the Inner Structure of the DUT

- Deterministic Test Cases
- Non-Deterministic Test Cases
- Inner Structure of the DUT

Self-Learning (b): Learning the Inner Structure of the DUT

- Non-Deterministic Test Cases
  - Supervised Clustering using Case-Based Reasoning
    1. Searching for Similar Deterministic Test Cases ($E_{KB}$)
    2. Using the Deterministic Case to Resolve the Non-Deterministic One $E_{OB}$.
Outline

- Optimization Module
- Self-Learning Module
- Generalization Module

Optimization (b): Generation of New Test Scenarios „Sequential Aggregation“

- **Given:**
  - Test Scenario A
  - Test Scenario B

- **Required:**
  - New Test Scenario that:
    - I. Preserves Scenarios A, B
    - II. Tests New Situation
    - III. Tests New Transitions
Generalization: Testing of Reconfigurable Systems

Given:
- Training Session(s)
- Data Base from DUT (A)

Required:
- Test Strategy:
  I. Test DUT (B)
  II. Reaction Evaluation

Rules Learning:

- Discrete Function, e.g. Set_Title (n)
- Continuous Function, e.g. Set_VOL
- Logical Function, e.g. Set_Mute
Conclusion

**Self-Learning Module**

- Observing Skilled Human Tester
- Learning the *Inner Structure* of the DUT

**Optimization Module**

- Rule-Based Optimization
- New Test Scenarios
- Testing Optimal Coverage

**Generalization Module**

- Classification
- Regression Learning


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Thank You

Self-Learning Module

- Perception
- Action
- Device Under Test (DUT)

Optimization Module

- Rule-Based Optimization
- New Test Scenarios
- Testing Optimal Coverage

Generalization Module

- Perception
- Action
- Device Under Test (DUT)

Thank You