

Learning Object Metadata (LOM) of the DeltaGUICheckDetection Capsule

1. Metadata Name

- a. DeltaGUICheckDetection Metadata

2. General Information about the Capsule

- b. **Name:** DeltaGUICheckDetection
- b. **Identifier:** ENACTEST_ID_17
- c. **Language:** English
- d. **Description:**

The aim of the Delta GUI Change Detection capsule is to increase students' awareness of the importance of delta changes in regression testing and to improve their understanding of the automated approaches that support delta change detection. It consists of two automated testing tools. The first tool is an explorative testing agent that generates graphical user interface (GUI) models that show how users interact with desktop, web and mobile applications. The second tool performs automated change detection by comparing two versions of these GUI models for the same software application.
- di. **Category:** Environment
- f. **Keywords:** Regression testing, GUI changes, Scriptless testing, Test Automation Tools
- g. **URL:** <https://github.com/TESTARtool/ChangeDetection.NET/wiki>

3. Life Cycle

- a. **Version:** 1.0
- b. **Status:** Final
- c. **Date:** [31-January - 2025]
- d. **Contributors:**
 - I. **Role:** Author
 - II. **Entity:** Fernando Pastor
 - III. **Role:** Author
 - IV. **Entity:** Tanja Vos
 - V. **Role:** Author
 - VI. **Entity:** Beatriz Marin

4. Meta-Metadata

- a. **Metadata Schema:** IEEE LOM-based ARIADNE
- b. **Language:** English

5. Technical

- a. **Format:** Software
- b. **Location:**
 - a. Web-based online Platform: Github
<https://github.com/TESTARtool/ChangeDetection.NET/tree/develop>
 - b. Other system (via ENACTEST Capsule repository)

c. **Requirement:**

Environment:

Windows 10, 11, Server 2016, Server 2019 OS
Java 11 (Java 17 and Java 21 are also actively maintained)
OrientDB v3.0.3X (to infer a State Model)
Chromedriver for web applications
Appium for mobile applications
Net6.0
Docker

6. **Educational**

- a. **Interactivity Type:** Interactive
- b. **Learning Resource Type:** Tool or Environment
- c. **Interactivity Level:** High
- d. **Intended End-User Role:** Learner (Master students)
- e. **Context:** Higher Education
- f. **Typical Age Range:** Adult learners (18+ years)
- g. **Difficulty Level:** Advanced
- h. **Description of Learning Objectives:**
 - i. Raise students' awareness about the importance of delta changes at regression testing.
 - ii. Understanding the strengths and limitations of automated approaches to support delta change detection.
- i. **Classification of the Learning Objectives According to Bloom's Taxonomy**
 - i. Understand: Importance of regression testing and the identification of delta changes from the GUI as a starting point for prioritising the test sequences to be executed during regression testing.
 - ii. Apply: Identification of delta changes from the GUI of two versions of one System Under Test.
 - iii. Analyze: Compare manual identification of delta changes at GUI level with automated delta change detection from GUI.
 - iv. Evaluate: Assess test effectiveness using metrics like number and type of changes detected.
- j. **Prerequisites:**
 - i. Prior knowledge of Software Testing.
 - ii. Prior knowledge of state models.

7. **Rights**

- a. **Cost:** Open-source
- b. **Copyright and Other Restrictions:** 3-clause BSD License
- c. **Description:** Licensed for educational and research purposes.

8. **Relation**

- a. **References:** Software Testing course in a Bachelor or Master Degree program

9. Annotation

- a. **Description:** This material serves as an interactive web-based environment that detects and highlights delta GUI changes among 2 releases of a system under test, where students can manually inspect and validate these GUI changes in the regression testing process.

10. Classification

- a. **Purpose:** Educational Material for Software Testing Course
- b. **Taxon Path:**
 - i. Discipline: Computer Science > Software Testing > Test Strategy > Regression Testing
 - i. Educational Approach: Project Based Learning AND Experiential Learning

11. Supporting Materials

- a. Wiki with detailed instructions for downloading, configuring, and running the TESTAR and GUI change detection tools with examples.
- b. Instructional videos providing guidance for setting up the environment and tools required for the capsule.
- c. Poster that summarizes the GUI change detection capsule.

12. Learning Sequence

- a. Students receive a class about the importance of regression testing and the different practices and tools that can be adopted to implement it.
- b. Students will manually analyse two versions of a SUT demo to detect GUI changes.
- c. Students will launch the automatic GUI change detection algorithm, which provides an OrientDB database containing two GUI state models inferred and graphically shows the change detected.
- d. Students compare manual detected changes with automatically generated ones.

13. Expected Consequences

- a. Students will gain awareness of the identification of delta changes from the GUI as a starting point for prioritising the test sequences to be executed during regression testing.
- b. Students will be aware of the benefits of using a delta GUI change detection tool.

14. Methodologies for Performance Assessment

- a. **Quantitative Metrics:**
 - a. Number of changes detected.
 - b. Difference in the number of changes with manual and delta tools.
- b. **Qualitative Assessment:**
 - a. Student survey to measure perceptions and learning experiences.