Structured literature review: Protocol

1) Introduction

In a software development project, ensuring its quality is extremely important. Thus, the Software Testing activity becomes essential. Typically, this activity is done during the software process before the product is delivered to the customer. There is a type of software test that is performed during the system maintenance stage when new versions of the system are implemented. According to ENGSTRÖN [1] "Regression testing is verifying that previously functioning software remains after a change".

Performing regression tests requires a lot of effort from the work team. To minimize this effort without losing the quality of the tests, selection, minimization, or prioritization techniques are used to reduce the number of test cases re-executed.

There are several studies in the literature that deals with these techniques, as well as different approaches to their application, such as: GRAVES [2] "An Empirical Study of Regression Test Selection Techniques"; ENGSTRÖM [1] - "A systematic review on regression test selection techniques"; YOO [4] - "Regression testing minimization, selection and prioritization: a survey".

Although we can find several studies in the literature on selection, minimization, or prioritization techniques in regression tests and proven approaches with empirical studies, we observe few studies on the subject with application in Android.

With the growth of the Mobile development market, especially the Android application market, it is essential to carry out a Structured Literature Review to know which regression testing techniques, whether selection, minimization, or prioritization, and which approaches are being developed targeting the Android application scenario.

2) Research Question (RQ)

The Structured literature review aims to identify studies that dealt with regression testing techniques for Android. For this study, we defined the following research question (RQ):

- **RQ 1: What are regression testing techniques available in the literature for Android?** This research question aims to identify the regression testing techniques for Android found in the literature with empirical evaluation.

To carry out this literature review, we adopted the methodology proposed by HILARY [3].

Population: Software researchers, developers, and testers.

Intervention: Regression Testing Techniques.

Outcomes: Regression Testing Techniques for Android.

Context: Empirical Evaluation.

3) Search Strategies

3.1) Search String

The search string used was:

- ("regression test" OR "regression testing") AND ("Android" OR "Android applications" OR "Android apps" OR "APPS")

3.2) Search process

Phase 1 - Automated search: We first performed an automated search in the electronic databases listed in Table 1.

Table 1: Databases.

Digital Library	URL
ACM Digital Library	https://dl.acm.org
DBLP	https://dblp.uni-trier.de
IEEE Xplore	https://ieeexplore.ieee.org/Xplore/home.jsp

Phase 2 - Manual search: We next performed a manual search at the leading conferences in the areas of Software Engineering and Testing listed in Table 2.

Table 2: Conferences/Journals.

#	Title
1	Design, Automation and Test in Europe Conference and Exhibition
2	International Conference on Software Engineering
3	International Symposium on Software Testing and Analysis
4	International Conference on Software Testing, Verification and Validation
5	International Symposium on Empirical Software Engineering and Measurement
6	International Conference on Theory and Applications of Satisfiability Testing
7	European Test Symposium
8	International On-Line Testing Symposium
9	International Test Conference
10	VLSI Test Symposium
11	IFIP International Conference on Testing Software and Systems
12	International Conference on Software Engineering and Knowledge Engineering
13	Latin American Test Workshop
14	International Conference on Tests and Proofs
15	International Conference on Mobile Software Engineering and Systems
16	Annual International Mixed-Signals, Sensors and Systems Test Workshop
17	International Workshop on Automating Test Case Design, Selection and Evaluation
18	International Workshop on Search-Based Software Testing
19	Brazilian Workshop on Systematic and Automated Software Testing
20	Workshop de Testes e Tolerância a Falhas

4) Selection criteria

For inclusion or exclusion of studies, the following criteria were used:

   a) **Inclusion criteria:**
   - Studies in the area of Software Engineering.
   - Studies dealing with regression testing techniques for Android.
   - Studies that have an empirical evaluation.

○ Studies written in English.
○

b) **Exclusion Criteria:**
○ Duplicate studies.
○ Studies without empirical evidence.
○ Short versions of other studies.

To accept a study, it must meet all inclusion criteria. On the other hand, if a single exclusion criterion was met, the study would be excluded from the final analysis.

The selection process of articles was done through the following process:
- Exclude candidate studies by title or abstract;
- Exclude candidate studies after reading their introduction sections, and;
- Delete candidate studies after a full-text reading.

5) Data Extraction Strategy

After the study selection stage, for each remaining work, the researchers must extract data from them according to Table 3:

Table 3: Data Extraction Form

Item	Value
Title	
Authors	
Year	
Database	
Keywords	
Publication venue	
Does the study present empirical evidence? (Yes or no)	
What is the methodology used by the authors?	
Regression Testing Technique Used	

6) Summary of Extracted Data

The data synthesis process used was the Narrative Synthesis method.

7) References:

[1] ENGSTRÖN Emelie, RUNESON Per, SKOGLUND Mats, A systematic review on regression test selection techniques. Information and Software Technology 52 (2010) 14–30. Department of Computer Science, Lund University, SE-221 00 Lund, Sweden.

[2] GRAVES Tood. L (Los Alamos National Laboratory), HARROLD Mary Jean (Georgia Institute of Technology), KIM Jung-Min (University of Maryland), PORTER Adam (University of Maryland), ROTHERMEL Gregg (Oregon State University), An Empirical Study of Regression Test Selection Techniques. ACM Transactions on Software Engineering and Methodology, Vol. 10, No. 2, April 2001, Pages 184–208.

[3] HILARY Arksey, O'MALLEY, Lisa, Scoping studies: towards a methodological framework. International Journal of Social Research Methodology. 2005; 19-32.

[4] YOO S., HARMAN M., Regression testing minimization, selection and prioritization: a survey. SOFTWARE TESTING, VERIFICATION AND RELIABILITY Softw. Test. Verif. Reliab. 2012; 22:67–120. Published online 11 March 2010 in Wiley Online Library (wileyonlinelibrary.com). King's College London, Centre for Research on Evolution, Search and Testing, Strand, London WC2R 2LS, U.K.