A Systematic Mapping Study on Testing in SPLE

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Abstract

Revision for literature and searching for the sources of an information in the different database are considered to be the most important pillar of the scientific research, whether a researcher, academic in preparing the scientific documents or any research. That is the most important part which helps the researcher in understanding any subject or research, besides it helps him to know the different opinions regarding the subjects, thus, it provides the researcher with the suitable and correct information that helps him to take the right decision regarding his study and knowing the possible ways he needs to This paper is used a software systematic map, and will be chose testing in the product line of software engineering as a subject of our search. The data base that used includes (**1328**) publications, after the first filter by using the inclusion and exclusion criteria, they reduced to (**505**) publications. We tried in the second filter to search in introduction in addition to the abstracts and keywords so we take (**174**) publications. In the last filter we take (**67**) publications after more details searching.

Keywords

Testing , Software Product Line Engineering , Quality Attributes , Performance , Reliability , Evaluate , Evolve , Technology , approach , methods and analysis , variability product.

دراسة منهجية ومرسومه على الاختبار لخط الانتاج في هنجسة البرمجيات

وسام علي محمود

الملخص

تعتبر مراجعة الادب والبحث عن مصادر للمعلومات في قاعدة بيانات مختلفة من أهم الاركان في البحث العلمي إذا كان الباحث او الاكاديمي ينوي إعداد وثائق علمية أو أي بحث علمي . وهذا هو الجزء الأكثر أهمية والتي تساعد الباحث في فهم أي موضوع أو بحث، بالإضافة إلى أنها تساعده على معرفة مختلف الآراء بشأن الموضوعات، وبالتالي، فإنه يوفر للباحث المعلومات المناسبة والصحيحة التي تساعده على اتخاذ القرار الصحيح فيما يتعلق بدراسته ومعرفة السبل الممكنة التي يحتاج اليها. وقد تم اعداد هذا البحث باستخدام طريقة (خريطة البرمجيات: منهجية)، ولقد اخترنا "اختبار في خط البرمجيات هندسة المنتج" باعتباره موضوع بحثنا. عدد المصادر التي تم جمعها من عدة قواعد للبيانات التي استخدمناها(١٣٢٨) مصدر بمختلف الانواع كتب ومجلات ومحاضرات وعروض تقديمية ومؤتمرات . بعد الفلتر الأول باستخدام معايير الانتقاء والإقصاء حصلنا على (٤٠٥) من المصادر. بعد الفلتر الاخير للمصادر كانت النتيجة هي (٦٧) بحث بعد مزيد من تفاصيل البحث.

1- Introduction

Brainstorming, which is used to produce keywords and reuse order string to get results search on any search engine become unuseful in front of engine strategy. Complexity in the structure of engine search and determinants made researchers to find methodology to reach goals research in tremendously information within the various databases. The systematic mapping study process to screening research results can be define by the classification of build way and design structure in the field of software engineering that interested. Results of analysis which is concentrates on frequencies of publications for classifications inside a predefined conspire [2]. An orderly mapping review permits the proof in a space to be plotted at an abnormal state of granularity [2].

The field of "Testing in Software Product Line Engineering" is our search topic in the current paper. We prepare a research question about it and search string. We tried to specify the incorporation and prohibition criteria to incorporate the publishing that matched the inclusion criteria and exclude the publications that the exclusion criteria. Therefore we can maintain a system that provides this testing without problems. There are a lot of techniques developed but nobody summarized these before.This paper provides a good summary of researcher who wants a future research on the ***"Testing in software product line engineering"*** . In addition it's may be providing some answers that will help them answer some questions related to this topics. A precise mapping study gives a structure of the kind of research reports and results what have been distributed by classifying them. It frequently gives a visual synopsis, the guide, of its outcomes, it requires less exertion while giving a more coarse-grained outline.

2-Research Question

The purpose of this study is to provide a clear vision of the selected area. To obtain on this vision we must determine some Research questions (RQs). The Questions we should definition carefully. Usually driven from research title and the relevant studies. Then analysis and determine the results are available within this area. The result help the researchers in this field access to the information want as quickly as possible.

Regularly one needs to outline frequencies of publication of time to see patterns. Another can be to recognize the gatherings in which inquire about in the zone has been published . Each one can use the result obtains as he/she wants. The number and formula for research questions of each systematic mapping is varying from one area to another. The

Research questions for runtime monitoring of service are shown in the following:-

RQ1/What is meaning by Testing in TSPE*?*

RQ2-What is the effect *Testing in Software Product Line Engineering* performance, reliability and quality?

RQ3-What kinds of evaluation for managing software product line engineering are done?

RQ4- Which strategy analysis is used in TSPE?

3-Search String

The formula and relevant keyword used in search string effect on the papers result from searching. The essential reviews are related to utilizing to pursuit strings of logical databases or perusing physically through significant gathering procedures , diary and work shop productions. A decent approach to make the inquiry string is to structure them as far as populace, mediation, correlation, and result . The structure of research string ought to obviously be driven by the exploration inquiries and catchphrases. In this way the hunt string can compose writing as shown in the following steps:-

(“Software product line engineering ” OR “Testing”) AND

(“Metods and analysis” OR “ Variability product ”) AND

(“approach” OR “quality attribute ” OR “performance” OR “reliability” OR “evaluation” OR “evolve” OR “technology”)

4- Search strategy

We used the search string of different database to collect the relevant studies.There are a lot of database provide data onto world. We must try to collect the largest possible number of relevant studies.We can classification its according to methods search. There are two main methods search automatics and manual search. For example , we can search out ACM digital library , IEEE explorer , springer link , international symposium on leveraging and computer science technology. As we search using journals, conferences and workshops they have extensive information. After three filter we get on results from publiccation venues that show to bellow in Table 1.

Table 1: Publication venues.

Journal Title	Number of Papers
IEEE explorer	27
ACM Didital Library	6
Springer Ling	8
International Symposium On Leveraging ISOL	4
Computer Science Technoloogy	11
Institute of Engineering and Technology IET	2
Internatial Journal of Cyber-Security and Digital Fornsics	1

IJCSDF	
Multi Media	3
Automated Software Engineering ASE	1
Service Oriented Computing and Application SOCA	4

5-Screening Of The Selected Papers

There are two criteria to screening of papers to find out which will be included in future study from research and previous literature. The results appeared according to build research question. In this search we can see how to execute these criteria The process of screening may be passing through numbers of stages. Each stage is stricter than previous one. Figure (1) explains the steps that implemented to complete systematic mapping .'

5-1 Inclusion criteria :

We kept all paper, books, work shop report technical that include managing variability in SPLE and the methods, approaches, analysis, all aspects of management variability and managing tools. While reading the titles should check the answer to everything related to the subject

5-2 Exclusion criteria :

We eliminated all as the following:

- Papers , books , reports that unreal outputs for managing variability in SPLE.
- Titles doesn't written in English and Papers duplicated.
- Papers incomplete and Literature just available in form of abstract .
- Power point presentation and Posters and advertising.
- Short papers less Than 2 pages.
- Deleted lecture and all documents that not related with our topic.
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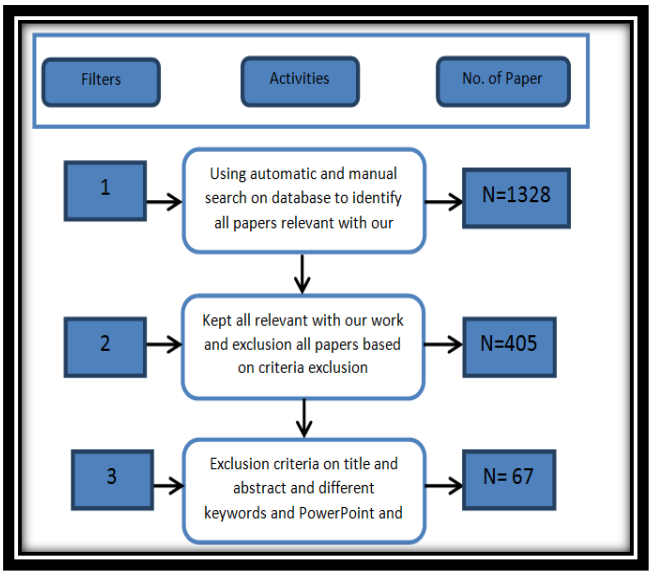

Figure 1: Main steps of systematic mapping study.

6 Building different viewpoints using a variety of schemes

We can explain any scheme or description to any subject through build schemes.

Defining Comprehensive vision to articles for any subject and deal with it through some of schemes. In this paper we will

show how to use these schemes? As we explain bellow .

6-1 Distribution of primary studies according to years

This chart show distribution number of studies to years and show percentage of publishing every year and it focus which paper is full or short pages and it described through using different colors to implementation this purpose [5, 7].

Figure (2) show distribution of primary studies according to years

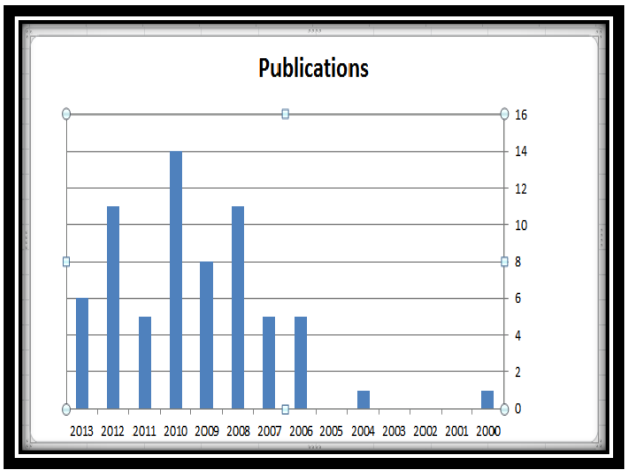

Figure 2: Show distribution of primary studies according to years.

6-2 Venue chart

This chart shows another viewpoint to researcher. It used distribution papers according to years, No. of papers, which one short or full page and types of papers if it is conference, workshop, book and journals [7] . Figure (3) show Venue chart .

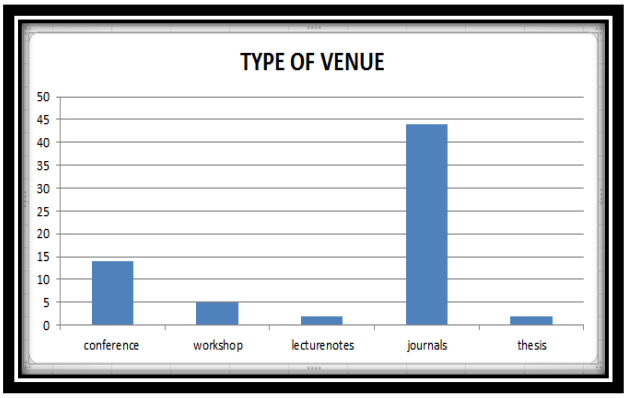

Figure 3: Show Venue chart.

7-Classification Scheme

In this paper there are three facts of classification data onto this fact. The first fact is (tool facet),it showed the criteria according to UML, manually, automatically ,textual comparison and design patterns as shown in Figure(4). Second a fact is (Goal facet) it shows criteria according to benefits ,cost ,prioritization ,test space and test time as shown in Figure(5).Third facet (Technique facet) it shows criteria according to Pass-fail, Partition ,Reuse ,Multi-object and Data analysis as shown in Figure(6). Finally Figure (7) explained the bubble chart classification mapping between (Tool facet and Goal facet) represents the intersections between Goals and Tools, The Goals will used as X-axis and Tools the Y-Axis where the tools are: and figure (8) explained the bubble chart classification mapping between (Techniques facet and Goal facet) use the same Goals as X-Axis and Techniques as Y-axis. All chart plots for 67 papers of

Testing in software product line Engineering.

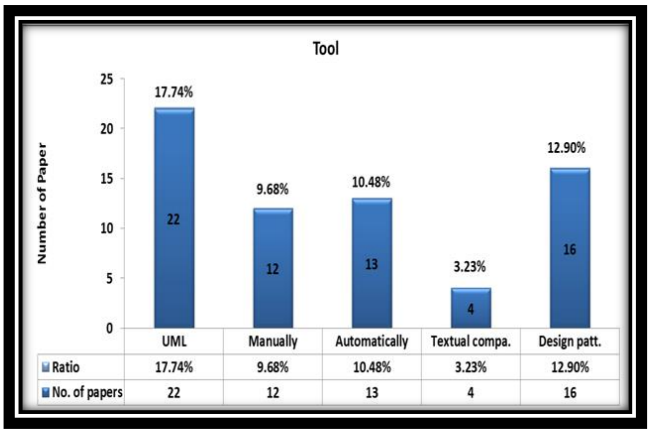

Figure 4: Distribution of studies based on tools facet.

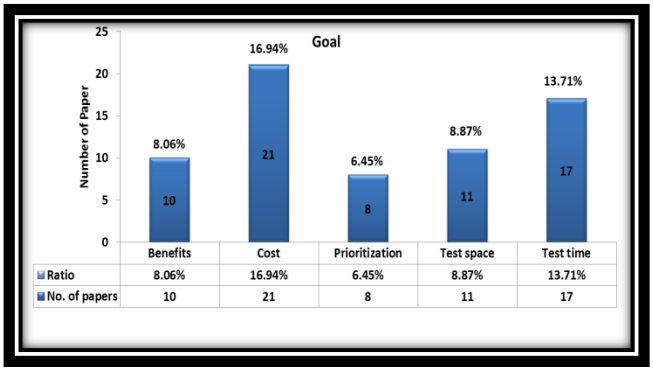

Figure 5: Distribution of studies based on Goal facet.

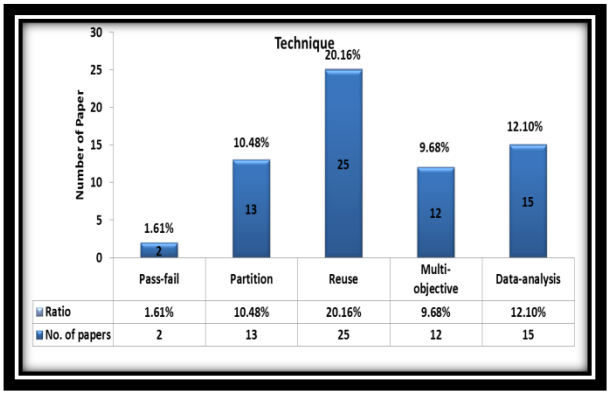

Figure 6: Distribution of studies based on Techniques facet.

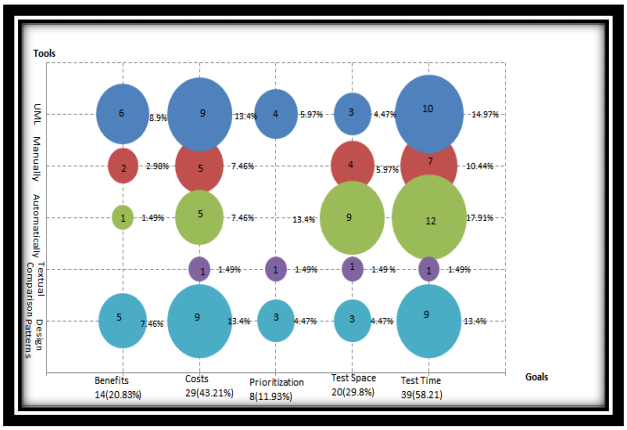

Figure 7: Distribution of studies based on Tools and focus of Goals.

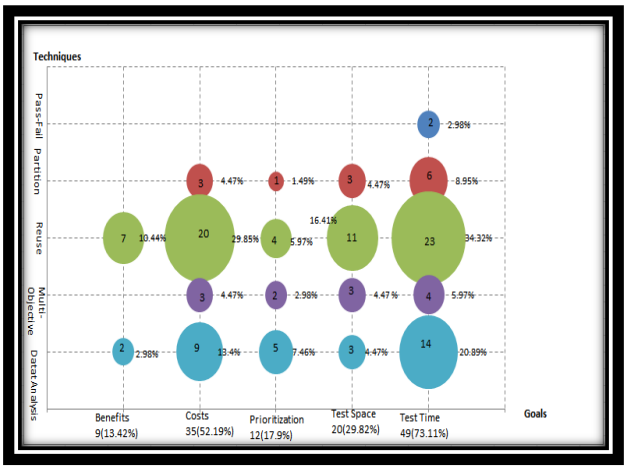

Figure 8: Distribution of studies based on Techniques and focus of Goals.

8-CONCLUSIONS

To perform a systematic mapping for any scientific research . Firstly we must determine number of research questions. That helped the researcher to arrive for relevant studies. The number of research questions sets by researcher. Effect him to determine the research direction .which ensures to him reaches to require information quickly he was seeking for it. This questions have selected depend on research field. The aim at some question is determining the target for analysis and

tools. While the aim at some questions used to determine the activities and properties performed by this research . Whereas some searcher use standard ways, criteria and mechanisms to search for it. Some time the researchers need to know the researches applicable or does reach it's target .The empirical studies used for this subject. The questions used to search for different opinions about studies and scientific analysis, represent the most important type of questions. Therefore to determine the questions give us results in particular trend. The all details and related things must be taken in consideration. This paper presented a systematic mapping study providing an overview of existing research on(***Testing in software product line engineering***).

We search in automatic and manual variant database such as Google scholar, we find **1328** papers various classifications (papers, book, report workshop, presentation, lecture, and others etc ..) .We apply screening of all papers by two filters on form two stage filtering in the first stage reduced it in to 405 papers and after that in second stage eliminated all papers in filters in to **67** papers that is hold it .After applying filters to elimination useful papers the result was: Used **1328** papers, **1261** elimination Paper , 67 Kept papers. The characterization of these logical works helped us to recognize how the logical generation is circulated throughout the years. Likewise to perceive what is the most utilized distribution settings. From different bar charts explained we conclude the most papers published through (2008,2010 & 2012) .We distribute the papers to several facet such Tools , Goals and Techniques facet . The tools facet explain the most papers use UML tool ,from goal facet show the most papers has cost goal ,while techniques facet show that most technique use reuse concept . In this paper the tow bubbles chart first one plot against tools facets and goal facet second one plot against techniques facet and goal facet .

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