Presentation of

Software engineering research for computer games: A systematic review

by Apostolos Ampatzoglou, Ioannis Stamelos from Aristotle University, Greece

Information and Software Technology (2010)

Presenter: Jianing Zhuang
10/07/2019
Background:

1. computer game development:
   fast growing industry
   rapid evolving (newer version in short interval)
   innovative in hardware and software technologies
   complicated, professional skills needed

2. software engineering (SE) techniques are needed for:
   flexibility
   maintainability
   less cost and effort
   better design ...

3. Different characteristics to classical SE development
Motivation:

1. Picture on the advancement of SE methodologies for games is not clear
2. Lack of a systematic review
3. Assess the state of the art on research on SE for games
4. Discuss possible important areas for future research
Methodology: Literature Review

1. research questions
2. search process
3. inclusion and exclusion criteria
4. quality assessment
5. data collection
6. data analysis
Methodology Details: 1. Research Questions

Q1: Which is the intensity of the research activity on SE methods for game development?
Q2: What SE research topics are being addressed in the domain of computer games?
Q3: What research approaches do SE researchers use in the domain of computer games?
Q4: What empirical research methods do SE researchers use in the domain of computer games?
Methodology Details: 2. Search Process

Libraries: ACM, IEEE, ScienceDirect, and SpringerLink
Keyword: “game”
Filter: “computer science” or “software engineering”
search result: 3463 papers, most are marginally related to SE

Methodology Details: 3. Inclusion and Exclusion Criteria

Inclusion: closely related to SE issues
Exclude: based on title, on abstract, on full text
remain: 84 papers

Methodology Details: 4. Quality Assessment

quality of the articles published is believed satisfactory
Methodology Details: 5. Data Collection

Extracted from each paper: type (journal/conference/workshop); journal/conference name; publisher; publication year; country; classification of topic, research approach, research method

<table>
<thead>
<tr>
<th>Topic classification</th>
<th>Empirical method</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software engineering</td>
<td>Experiment</td>
<td>A set of subjects is asked to perform a task in a highly controlled environment. The results are derived from observing the subjects during the experiment, from inspecting the task outcome or from questioning the subjects at the end of the procedure.</td>
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<tr>
<td></td>
<td>Survey</td>
<td>A set of subjects is asked to fill-in questionnaires either directly, or via internet. The results are derived from the valid answers to the questionnaire.</td>
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<tr>
<td></td>
<td>Case study</td>
<td>A project, an activity or an assignment is monitored with respect to the methodology under study. Results are directly derived from project measurements.</td>
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Methodology Details: 6. Data Analysis

Q1: intensity of the research activity: number of studies (1) published per year; (2) each digital library hosts; (3) each country and continent produced

Q2: research topics: topic classification

Q3: research approaches: research approach classification

Q4: empirical research method: research method classification
Evaluation and Discussions: Research Activity

Research on SE for computer games increased activity during last 5 years, increase ratio faster than traditional SE.

<table>
<thead>
<tr>
<th>Year</th>
<th>Journal</th>
<th>Conference</th>
<th>Workshop</th>
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<tr>
<td>Total</td>
<td>26</td>
<td>54</td>
<td>4</td>
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</tr>
</tbody>
</table>

# publications per publisher

- ACM: 32
- IEEE: 25
- Springer: 19
- Elsevier: 8

ACM hosts most publications

USA dominates SE gaming research

Research activity per year:

Activity increase ratio:
Evaluation and Discussions: Research Topics

dominant topic: requirements
some topics are not covered

reasons for the difference: (1) special needs and priorities of game development. (2) game engineering is a young domain, need more fundamental research. expect: topics neglected so far will attract interests when fundamental subjects mature..
Evaluation and Discussions: Research Approaches & Empirical Methods

research approaches

no significance differences

empirical research methods

case study more frequent in agile survey more frequent in game experiment more frequent in traditional SE

reason: level of maturity: SE most mature -> most experiments; game research is young -> (1) it lacks existence project data, so fewest case study; (2) need knowledge from domain experts, so it has most survey.
Strength and Weakness:

Strength:
- clear presentation
- detailed procedure
- easy to follow
- informative statistical data
- comprehensive literature review
- plausible explanations

Weakness:
- lack of technical details (code, algorithm ... )
- alternative explanations
- no profound understanding
- authors contribution to this field unclear
Related Works:

[13]: differences between game SE and classical SE, practitioner’s: limited lifecycle; corrective maintenance & adaptive maintenance.

[6, 10] possibility of employing the evidence-based paradigm in SE.

[1, 8] how to conduct a literature review
Conclusion

A literature review for game SE research
Follow literature review paradigm
Statistical data
Comparison between game SE and traditional SE
Lack of technical details
Thank you!
Questions:

1. According to the paper, which research topic was most addressed in the computer game software engineering?

2. Among the descriptive, explanatory, and empirical research approaches, the one most frequently mentioned in the domain of computer game software engineering was explanatory. Was this trend same as or different to the domain of traditional software engineering?

3. Among the empirical methods (surveys, case studies, experiments), which dominates in computer game software engineering? Which dominates in traditional engineering?