Personal Recommendations in Requirements Engineering: The OpenReq Approach

A Research Preview

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Introduction

RE is critical for successful software development

High quality of RE

How to achieve it when thousands of requirements, stakeholders and feedback are involved?
- Requirements and stakeholder discovery is difficult!
- Reaching a decision is difficult!
- Requirements quality is difficult!
Introduction

• Use of Recommender systems (RSs) to help in some of the tasks
  • Help to find information…
  • Help to make decisions…
  • … in situations where stakeholder’s lack experience
  • … in situations where they cannot consider all the data at hand

However, the majority of RSs in RE focus on specific tasks
OpenReq – H2020 European Project

GOAL: Develop intelligent recommendation and decision technologies (based on AI techniques) to give support to requirement analysts during different RE stages

<table>
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<tr>
<th>OPENREQ Platform</th>
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<td><strong>Requirements Intelligence Engine</strong></td>
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<td>Automated identification of requirements from different knowledge sources</td>
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<td><strong>Personal Recommender Engine</strong></td>
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<td>Recommendations:</td>
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<td>- Requirements</td>
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<td>- Requirements-related aspects</td>
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<td>- Stakeholders</td>
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<td><strong>Group Decision Engine</strong></td>
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<td>Support of decision making in release planning:</td>
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<td>- Providing a solution that fulfills all users preferences</td>
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<td>- Conflict identification</td>
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<td><strong>Requirements Dependency Engine</strong></td>
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<td>Automatic identification of dependencies</td>
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Personal Recommendations in Requirements Engineering: The OpenReq Approach (REFSQ’18)
What is a personal recommendation?
- Consider stakeholders as individuals...
- ...in contrast to group recommendations

Types of personal recommendations (marked by the project!):
A. Recommendation of relevant requirements
B. Improvement of requirements quality
C. Prediction of requirements properties
D. Identification of relevant stakeholders
E. Context-aware recommendations
# Personal Recommendations in OpenReq

## A. Recommendations of relevant requirements

1. Identification of actual requirements
   - I.e. text that contains requirements in contrast to text that does not bring information
   - Binary classifier + NLP techniques

2. Identification of similar requirements
   - From the same or past projects
   - Content-based recommenders + NLP + VSM + Similarity metrics

3. Identification of related requirements
   - From the same or past projects
   - Content-based recommenders + Collaborative recommenders + Topic modelling

## B. Recommendations about quality of requirements

1. Measure the quality of requirements
   - To identify bad quality requirements
   - Set of rules for quality properties

2. Tips for improving the quality
   - E.g. change of words (to homogenize vocabulary or reduce ambiguity) or adding missing information
   - NLP techniques + Knowledge-based recommenders

## C. Recommendations for requirement properties

- To predict key properties of requirements, e.g. prioritization
- Approaches of A.2 (if the task is reduced to a similarity problem)
  - n-classifier

## D. Recommendations of relevant stakeholders

- To identify stakeholders that can cooperate on the definition of requirements
- Approaches of C (if stakeholders are considered a property)
  - Collaborative recommenders + Social networks

## E. Context-aware recommendations

- To determine whether pull or push recommendations are needed in a specific context

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   Improved by 1) Domain ontologies, 2) Semantic models
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Conclusions

• Personal recommendations in OpenReq to improve and speed-up RE:
  • Combination of state-of-the-art RSs and NLP algorithms/techniques

• OpenReq will provide:
  • A new RE solution
  • API
  • Interfaces to existing RE tools (e.g. DOORs, Jira)

• OpenReq prototype (currently) includes:
  • Recommendation of relevant requirements
  • Group decision making
  • Conflict resolution
Thank you!  Questions?

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