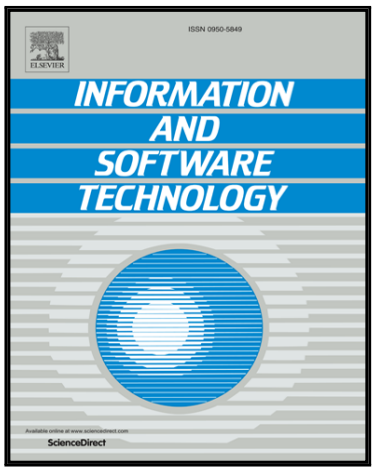
Accepted Manuscript



The Use of Artificial Neural Networks for Extracting Actions and Actors from Requirements Document

Ayad Tareq Imam , Aysh Al-Hroob , Rawan Al-Heisa

PII: S0950-5849(18)30075-2
DOI: 10.1016/j.infsof.2018.04.010
Reference: INFSOF 5986

To appear in: *Information and Software Technology*

Received date: 6 May 2017
Revised date: 28 March 2018
Accepted date: 29 April 2018

Please cite this article as: Ayad Tareq Imam , Aysh Al-Hroob , Rawan Al-Heisa , The Use of Artificial Neural Networks for Extracting Actions and Actors from Requirements Document, *Information and Software Technology* (2018), doi: 10.1016/j.infsof.2018.04.010

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

The Use of Artificial Neural Networks for Extracting Actions and Actors from Requirements Document

Ayad Tareq Imam, Aysh Al-Hroob, Rawan Al-Heisa

aysh@iu.edu.jo; alzobaydi_ayad@iu.edu.jo; rawanmhesa@yahoo.com
Dept. of Software Engineering, Faculty of Information Technology, Isra University, Amman 11622, Jordan

Abstract

Context: The automatic extraction of actors and actions (i.e., use cases) of a system from natural language-based requirement descriptions is considered a common problem in requirements analysis. Numerous techniques have been used to resolve this problem. Examples include rule-based (e.g., inference), keywords, query (e.g., bi-grams), library maintenance, semantic business vocabularies, and rules. The question remains: can combination of natural language processing (NLP) and artificial neural networks (ANNs) perform this job successfully and effectively?

Objective: This paper proposes a new approach to automatically identify actors and actions in a natural language-based requirements' description of a system. Included are descriptions of how NLP plays an important role in extracting actors and actions, and how ANNs can be used to provide definitive identification.

Method: We used an NLP parser with a general architecture for text engineering, producing lexicons, syntaxes, and semantic analyses. An ANN was developed using five different use cases, producing different results due to their complexity and linguistic formation.

Results: Binomial classification accuracy techniques were used to evaluate the effectiveness of this approach. Based on the five use cases, the results were 17 % – 63 % for precision, 56 % – 100 % for recall, and 29 % – 71 % for F-measure.

Conclusion: We successfully used a combination of NLP and ANN artificial intelligence techniques to reveal specific domain semantics found in a software requirements specification. An Intelligent Technique for Requirements Engineering (IT4RE) was developed to provide a semi-automated approach, classified as intelligent computer-aided software engineering.

Keywords: NLP, ANN, I-CASE, Software Requirements, GATE, MATLAB.

1. Introduction

User requirements are the natural language descriptions of services required by a system. These descriptions are supplied by stakeholders and should be used for satisfying contracts, standards, and specifications (Sommerville, 2010) (Wiegers & Beatty, 2013). Each user requirement is formed as a use case, which is a representation of the user's interaction with the system. This interaction represents an invocation of a service, describing the following elements (Bruegge & Dutoit, 2010).

1. Use case name: an action or a system function.
2. Actors: entities (i.e., persons or systems) that interact with the system by invoking a service from it.
3. System boundary: system scope and boundary name.
4. Relationship: link type to other use cases. There are four types: association, include (i.e., use), extend, and generalization.

Download English Version:

https://daneshyari.com/en/article/6948007

Download Persian Version:

https://daneshyari.com/article/6948007

Daneshyari.com