



# **Generation of Use Case Diagram Automatically from User Requirements Using Genetic Algorithm**

Submitted in Partial Fulfilment of the Requirements for the Degree of  
Master of Science in Software Engineering

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The undersigned have examined the thesis entitled '*Automation of Extracting Use Case and Actors*' presented by *Eyad M. Jebril*, a candidate for the degree of Master of Science in Software Engineering and hereby certify that it is worthy of acceptance.

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# DEDICATION

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*To my great parents, who never stop giving in countless ways ....*

*My beloved brothers and sisters....*

*To all my family, the symbol of love and giving ....*

*To my friends who encourage and support me ....*

*To all people in my life who touch my heart....*

**I dedicate this research**

**Eyad M. Jebri**  
August 2017

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## PUBLICATION(S)

**“An Algorithmic Approach to Extract Actions and Actors (AAEAA)”.**

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## LIST OF ABBREVIATIONS

AAEAA	Algorithmic Approach to Extract Actions and Actors
AI	Artificial Intelligence
ANN	Artificial Neural Network
FN	False Negative
FP	False Positive
GA	Genetic Algorithm
GUI	Graphical User Interface
I-CASE	Intelligent Computer Aided Software Engineering
IDE	Integrated Development Environment
IUCDG	Intelligent Use Case Diagram Generator
NL	Natural Language
NLP	Natural Language Process
NomBank	Noun Bank
POS	Part of Speech
PropBank	Proposition Bank
RE	Requirement Engineering
SDLC	Software Development Life Cycle
SRD	Software Requirement Document
SRL	Semantic Role Labelling
SRS	Software Requirement Specification
TN	True Negative
TP	True Positive
UML	Unified Modelling Language

## ABSTRACT

The use case model is the simplest representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. Use cases serve as a unifying thread throughout system development. Use-case model is the result of the requirements engineering, and it is used as an input to the later design and test phases.

The aim of this thesis is to develop an Intelligent Computer Aided Software Engineering (I-CASE) tool that automatically extracts actions and actors of use case model from given functional requirements. The view we used to distinguish actor and use case in the research is to make use of what called thematic role. Based on that, we developed an algorithmic approach of manual practicing the developing of use case diagram, which is upgraded to a semi manual version that uses software for performing the revealing thematic roles by using semantic role labelling (SRL) software of NLP, and uses sketcher program to draw use case diagram by using yUML beta web service. The ultimate goal, which is called Intelligent Use Case Diagram Generator (IUCDG), utilizes Genetic Algorithm (GA), which is implemented by using C# programming language to develop a classification rule(s) to be used for recognizing each of use case and actor in addition to the SRL and yUML beta web service.

The results are evaluated by using confusion matrix, which encompasses the calculating of number of factors, in which accuracy is one among them. The accuracy of IUCDG registers approximately >80 for recognizing actors and use cases.

**Keywords:** Software Requirements Specifications, Thematic Role, Genetic Algorithm, Use Case diagram