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Advanced Engineering and ICT-Convergence Proceedings (AEICP)

9th International Conference on Advanced Engineering and ICT-Convergence (ICAEIC-2022)

July 13-15, 2022

Organized by

ICT - Advanced Engineering Society, Seoul, Korea (ICT-AES)
Bima Build. #525, 20 Kwangwoon-ro, Nowon-gu, Seoul
Email: info@ictaes.org, Tel.: +82-2-940-8626 / 8637

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July 13-15, 2022

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Seongsoo Cho, Professor, Kongju National University, Korea

Welcome Address

Prof. Dr. Gi-Chul Yang
Conference Chair
Mokpo National University, Korea

I am honored to be here as a Conference Chair of the 9th International Conference on Advanced Engineering and ICT-Convergence 2022 (ICAEIC-2022) to welcome all distinguished guests and eminent speakers from various part of the world. This time, we are gathering here face-to-face for the conference. The ICAEIC-2022 is dedicated to the research and development of a broad range of Engineering and ICT-Convergence related topics, with focuses on theory, simulation, design, realization, measurement, and applications. We expect the ideas and technological solutions presented here will contribute to the field of Engineering and the ICT industry as the enabling force for positive development for the benefit of the society. We are conducting total 5 tracks. For this conference, the organizing committee has accepted 69 out of 110 papers (62.7%) excluding the keynote paper for the presentations. Some papers have been rejected to maintain the quality of the conference. In this conference, the papers from 9 countries (Korea, Nepal, Burundi, Australia, USA, India, England, China, Vietnam) will be presented. I fully believe that these presentations and the keynote speech will be highly interesting and interactive. I would like to express our sincere appreciation to all the committee members and many other helping hands behind the scenes who have significantly contributed to set-up this conference. My special thanks go to all committee members, session chairs and the eminent persons who are attending here.
Next, I would like to announce the 10th international conference which will be held in Thailand on February 7-10, 2023. I hope, you will submit your research papers and present over there.
Thank you and I hope you will have a good time in Jeju.

Thank you!

July 13, 2022.

Congratulatory Remarks

Prof. Dr. Bhanu Shrestha
Chairman of ICT-Advanced Engineering Society
Kwangwoon University, Korea

Ladies and Gentlemen,
First of all, I'd like to welcome all the distinguished guests and participants today for the 10th International Conference on Advanced Engineering and ICT-Convergence (ICAEIC-2022). We are happy to be here for the 10^{th} international conference to conduct face-to-face. As we know that the technologies are rapidly increasing that makes the future society to facilitate the people. That means, as a researcher, as an academician, and as a scientist, we are actually, designing the future society for the human welfare. Therefore, we need such platform to change our society. At the same time, we are living in the era of the 4th industrial revolution where artificial intelligence, big-data, internet of things (IoT), augmented reality (AR), virtual reality (VR), and metaverse are included. These all are related to information and communication technologies (ICTs) and convergence technologies. Therefore, we have selected the emerging topic on artificial intelligence, big-data, AR / VR and convergence technologies for the conference. I hope that this platform will be helpful to understand recently developed technologies and their impact on human life and society.

On behalf of the ICAEIC-2022 Organizing Committee, we thank keynote speakers, all the session chairs, publication chairs / co-chairs, technical chairs / co-chairs, program chairs / co-chairs, international advisory board honorary chairs, and all presenters. We would like to extend our special thanks to Conference Chair, Prof. Dr. Gi-Chul Yang from Mokpo National University, Korea, Program Chair Prof. Dr. Youngman Kwon from Ulji University, Korea, International Co-ordinator Prof. Surendra Shrestha from Institute of Engineering (IoE), Pulchwok Campus, Tribhuvan University, Nepal, Publication chairs, Prof. Seongsoo Cho and Technical chair, Prof. Sunchul Kwon for their invaluable guidance in organizing the conference. I hope, this conference will be a success and fruitful and established a brotherhood relationship under Advanced Engineering and ICT-Convergence.
Thank you very much.

July 13-15, 2022

Conference Program (9th ICAEIC-2022)

Day 1 / Wednesday, July 13, 2022

10:00 – 11:30	**Paper Registration & Meeting**	
10:00 – 10:15	Organizing Committee Meeting	
10:00 – 11:30	Paper Registration / Name Tag Distribution	
11:30 –13:00	**Lunch Break**	
13:00 – 13:30	**Opening Ceremony**	**Main Hall**
13:00 – 13:10	Welcoming & Opening Remarks by Conference Chair, Mokpo National University	
13:10 – 13:15	Greetings from Representative of BonC Innovators Company	
13:15 – 13:20	Greetings from Representative of Tracom Company	
13:20 – 13:25	Congratulatory Remarks by Chairman of ICT-AES	
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13:50 – 14:00	**Break Time**	
14:00 –17:30	**Technical Session (Oral Session) 1**	**Main Hall**
	Session Chair: Prof. Dr. Yeonwoo Lee,	
14:00 –17:30	**Technical Session (Oral Session) 2**	**Hall A**
	Session Chair: Prof. Dr. Surendra Shrestha,	

Day 2 / Thursday, July 14, 2022

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	Session Chair: Prof. Dr. Sun Park,	

09:00 –12:30 **Poster Session** **Hall A**

Evaluation Committee: Prof. Dr. Surendra Shrestha,
Prof. Dr. Yeonwoo Lee,
Prof. Dr. Youngman Kwon,
Prof. Dr. Jinho Han,
Prof. Dr. Soonchul Kwon

12:30 –14:00 **Lunch Break**

14:00 –17:30 **Technical Session (Oral Session) 1-2** **Main Hall**

Session Chair: Prof. Dr. Youngman Kwon,

14:00 –17:30 **Technical Session (Oral Session) 2** **Hall A**

Session Chair: Prof. Dr. Jinho Han,

15:30 – 15:40 **Break Time**

Closing Ceremony Time : 17:40 – 18:10

- **Certificate Distribution Announcement** (Certificates + Best Paper Awards): One winner will be selected from each session for the best paper award based on the evaluation of each session chair (by Prof. Dr. Yeonwoo Lee).
- **Closing Remarks** : Prof. Dr. Bhanu Shrestha, Chairman of ICT-AES, Korea.

17:40 – 18:10 **Award Ceremony and Photo Session** **Main Hall**

18:10 – 20:10 **Banquets**

Day 3 / Friday, July 15, 2022

10:00 –11:00 **Organizing Committee Meeting**

11:00 –17:00 **Individual Technical Tour & Jeju Island Tour**

Preparation for Presentation

- All registered presenters are requested to attend the opening ceremony.
- Please confirm the room number you have assigned in terms of a poster and oral sessions.
- Each presentation will have 20 minutes for presentation including 5 minutes Q/A time.
- Each presenter must copy your presentation files to the computer guided by the volunteers

Session in Details

Day 1 / Wednesday, July 13, 2022

Time: 13:00 – 13:30

Plenary Session **Room- Main Hall**

MC: Prof. Dr. Yeonwoo Lee, Department of Information Communication Engineering, Mokpo National University, Korea

13:00 – 13:10 Welcome Remarks

Prof. Dr. Gi-Chul Yang, Conference Chair, Mokpo National University, Korea

13:10 – 13:15 Greetings from Representative of BonC Innovators Company

13:15 – 13:20 Greetings from Representative of Tracom Company

13:20 – 13:25 Congratulatory Remarks

Prof. Dr. Bhanu Shrestha, (Professor, Kwangwoon University, Korea, and Chairman of ICT-AES, Korea)

Time: 13:25 –13:50

Keynote Speech **Room- Main Hall**

Keynote Session Chair: Prof. Dr. Surendra Shrestha

Keynote Speaker : Prof. Dr. Sukhwa Hong, University of Hawai'i Data Science, USA

Title: A Network-based Text Visualization Model for Online Crowdfunding Analysis

Time: 13:50 – 14:00

Break Time

Time: 14:00 – 17:30 PM

Presentation (Oral) Session 1 **Room - Main Hall**

Session Chair: Prof. Dr. Yeonwoo Lee

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ICAEIC-2022-151
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(Zhaohui Tang)

ICAEIC-2022-126
Mixup Methods in Low Resource Multi-Label Classification
(Minkyu Park, Juntae Kim)

ICAEIC-2022-124
A Study on a Cloud-based Smart Farm Capable of Real-time Monitoring and Remote Control
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ICAEIC-2022-128
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Prof. Dr. Jinho Han / Prof. Dr. Soonchul Kwon

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Time: 14:00 – 17:30

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Time: 17:30 – 17:40

Break Time

Time: 17:40 – 18:10

Closing Ceremony

- Certificate Distribution Announcement (Certificates + Best Paper Awards: One winner will be selected from each session for the best paper award based on the evaluation of each session chair.
- Closing Remarks : Chairman of ICT-AES, Korea: Prof. Dr. Bhanu Shrestha

Time: 18:10 – 20:10

Banquets

Day 3 / Friday, July 15, 2022

10:00 –11:00 **Organizing Committee Meeting**

11:00 –17:00 **Individual Technical Tour & Jeju Island Tour**

Preparation for Presentation

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- Each presenter must copy your presentation files to the computer guided by the volu

NOTE:

- The presentation time is 20 minutes (15 min-presentation and 5 min-Q&A) for each presenter except Keynote speakers (25 minutes 5 min-Q&I).
- This program can not be changed but if there are some problem to make presentation by authors, the presentation can be slightly changed on authors' request.
- All authors are requested to join in the conference on the given time.

Contact:

Bima Build. #525, 20 Kwangwoon-ro, Nowon-gu, Seoul, Korea (01897). Email: info@ictaes.org, Tel.: +82-2-940-8626 / 8637 | Website: https://ictaes.org

Contents

Keynote Speaker

Prof. Dr. Sukhwa Hong

University of Hawai'i Data Science, USA

Sukhwa Hong (sukhwa@hawaii.edu) is an Assistant Professor of Management Information Systems and Data Science, College of Business and Economics at University of Hawai'i at Hilo. He is also a part of the Hawaii Data Science Institute (HI-DSI) at University of Hawai'i System.

He teaches Quantitative Business Analysis and Data Sciences courses in addition to introductory-level courses in business. He obtained his Bachelor's degree in Industrial and Systems Engineering from Korea University. Following that, he earned his Master's (Operations Research) and Ph.D. (Business Information Technology) from Virginia Tech.

Advanced Engineering and ICT-Convergence Proceedings (AEICP)
ISSN : 2635-4586

Cost Extraction with Reverse Engineering Approach

So Young Moon[1], and R. Young Chul Kim*

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Abstract

In the initial stage of a software development project, it is difficult to estimate the size of the software without any information about the new software project. But still, we use the function point approach to estimate cost of a new project. Also, we can't prove it whether it is correct the cost before and after the project. So far, in real software fields, everybody has only focused on estimating the cost of calculating the size of a project using the Function Point, but still not proved it. To solve this problem, we propose our cost extraction approach based on a reverse engineering approach that proves it after the project. This approach tries to prove the cost with the number of implemented FP bewteen before and after a project.

Keywords: *Function Point, Reverse Engineering, Extracting Cost with Reverse Engineeing, Code Visualization.*

1. Introduction

As software is used in many fields, the cost estimation of a new project is a very important issue. From the point of view of the order holder, the problems of software size calculation are as follows: 1) there are difficulties in judging/estimating the size due to the unclear and incomplete requirements, 2) some incorrect requirements make incorrect cost estimation [1, 2], and 3) it is difficult for the contracting company to evaluate the adequacy of the scope of tasks compared to the project cost, and to judge whether the client's task is changed or additional tasks are justified during project execution. From the point of view of the ordering party, they require any proof that the purchaser has not paid excessively, but impossible to do it. In some studies, the function score is improved to predict the development cost [3, 4]. Still proving to spend a reasonable cost on the source code has not been performed. To solve this problem, cost verification should be performed based on the most recently developed source code.

The structure of this paper is as follows. Chapter 2 describes related research, and Chapter 3 explains the verification method based on the reverse engineering method with an application example. Chapter 4 describes the conclusions.

2. Related Work

	Function Levels		
Components	Low	Average	High
ILF	x 7	x 10	x 15
EIF	x 5	x 7	x 10
EI	x 3	x 4	x 6
EO	x 4	x 5	x 7
EQ	x 3	x 4	x 6

		Data Element Type		
		1–19	20–50	>=51
Record Element Type	1	Low	Low	Average
	2–5	Low	Average	High
	>5	Average	High	High

		Data Element Type		
		1–19	20–50	>=51
File Type Referenced	1	Low	Low	Average
	2–5	Low	Average	High
	>5	Average	High	High

Figure 1. Function Point's Complexity.

Figure 1 shows the function point's complexity by the IPFG as follows. The function score is the sum of the function complexity score calculated from the data function type and the transaction function type. As a data function type, a file used inside the application boundary is called an internal logical file (ILF), and when a file of another application is used, it is called an external interface file (EIF). We calculate the complexity for ILF and EIF in a specific system analysis. The function point is calculated by summing the result of calculating the data function point and the transaction function point. The transaction function score is calculated with the complexity for EI, EO, and EQ. The transaction function type is classified as external input when data processing is performed inside or outside the application boundary, external input when there is input processing, external inquiry when there is data inquiry, and external output when there is a file creation or calculation between data [5].

3. Cost Extraction Based on Reverse Engineering

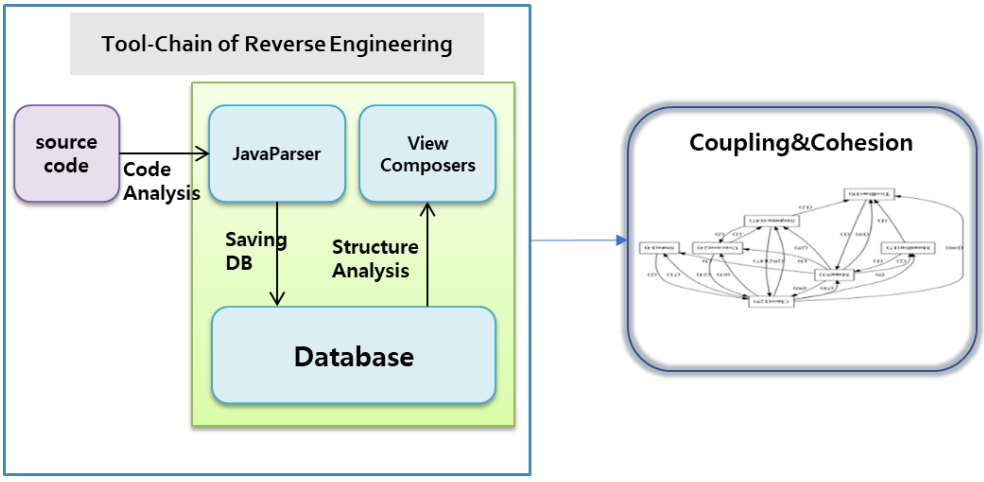

Figure 2. Code Visualization Tool Chain with JDT-based Parser.

Figure 2 shows the tool chain for code visualization based on reverse engineering. The execution process of the tool chain is as follows: 1) Java parser parses the source code, 2) The parsed code sentence is stored in the database, 3) Select data from the database by creating query statements for ILF, EIF, EI, EO, and EQ related to the function point, and create a Dot script using the searched content, and 4) Visualization is performed with the contents of the Dot script based on the query statement created in (3) [6].

Class Name	Member Type	Member Access	IsStatic	IsFinal	Return Type	MemberName	Parameter Type
DBManager	method	public	0	0	void	customerReg	String, String, String, String, int, String, String
DBManager	method	public	0	0	HashMap	login	String, String
DBManager	method	public	0	0	void	customerMod	String, String, String, String, Int, String, String
DBManager	method	public	0	0	boolean	customerDelete	String, String, String, String

$$\mathbf{TFP} = \sum_{i=1}^{n} F_i's\ \boldsymbol{Complexity\ of\ EI} + \sum_{j=1}^{n} F_j's\ \boldsymbol{Complexity\ of\ EO} + \sum_{k=1}^{n} F_k's\ \boldsymbol{Complexity\ of\ EQ}$$

$$\begin{aligned} \boldsymbol{TFP} &= \boldsymbol{customerReg(EI) + login(EQ) + customerMod(EI) + dustomerDelete(EQ)} \\ &= \mathbf{3 + 3 + 3 + 3} \\ &= \mathbf{12} \end{aligned}$$

Figure 3. Various Methods in Source Code.

Figure 3 is a part of DBManger class in DB. Various Methods such as customerReg, login, customerMod, and customerDelete exist in the DBManager class. Information such as method return type, parameter type, member access specifier, static, final, etc. can be found. Get the name and information of the method in the code from the contents of this table. The formula in Figure 3 is explained as follows. EI, EO, and EQ are classified by function, and the complexity is calculated according to the number of RET and FTR. Therefore, customerReg is EI and complexity is 3. login is EQ and complexity is 3. customerMod is EI and complexity is 3. customerDelete is EQ and complexity is 3. The function score is 12 in Figure 3.

4. Conclusion

Estimating the cost or size of a software development project is critical to the project's success. This study attempts to prove project size estimation by analyzing data and transaction functions through reverse engineering. The purpose of this study is to verify the size of the project at the time of ordering and completion.

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