



**Faculty Of Information and Communication Technology**

**INTERNSHIP SUPERVISOR SELECTION USING GENETIC  
ALGORITHMS**

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(Software Engineering and Intelligence)**

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**A thesis submitted  
in fulfillment of the requirements for the degree of  
Master of Computer Science (Software Engineering and Intelligence)**

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## DECLARATION

I declare that this project entitled “Internship Supervisor Selection Using Genetic Algorithms” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : .....

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## APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Master of Computer Science (Software Engineering and Intelligence).

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Supervisor Name : DR HALIZAH BINTI BASIRON

Date : 10 JULY 2015

## **DEDICATION**

*To my beloved family especially my husband, my son and my daughter*

## **ABSTRACT**

Supervisor selection is a frequently task found among the committee or management group in several organization. The selection tasks will be prepared at accordance times with the proper listing at particular event or duration. Indirectly, the organization of committee or management group will be more efficient; well organized and manageable. In this study, Fakulti Teknologi Maklumat Dan Komunikasi (FTMK) at Universiti Teknikal Melaka Malaysia (UTeM) was chosen to be the case study for the researcher to test the genetic algorithm based on the criteria used by the faculty. From the investigation the internship supervisor selection can be defined as forming the allocation supervisor to the internship student from the FTMK with certain constraints to be satisfied. By using genetic algorithm approach, the priority factors for the assigning faculty supervisor to internship student has been identified and also development model of selection has been done to fulfill the criteria for the selection specified by the FTMK. Experimental results from the model selection output can used to verify with an actual data on selection of internship supervisor in FTMK, UTeM.

## **ABSTRAK**

*Pemilihan penyelia latihan industri merupakan tugas kerap ditemui di kalangan Kumpulan Jawatankuasa atau Pengurusan di dalam sesebuah organisasi. Tugas pemilihan ini seharusnya disediakan dengan penyenaiaan yang tepat mengikut kejadian atau tempoh tertentu. Secara tidak langsung, Kumpulan Jawatankuasa atau Pengurusan sesebuah organisasi akan menjadi lebih cekap, teratur dan terurus. Dalam kajian ini, Fakulti Teknologi Maklumat Dan Komunikasi (FTMK) di Universiti Teknikal Melaka Malaysia (UTeM) telah dipilih sebagai kajian kes bagi penyelidik untuk menguji algoritma genetik yang berdasarkan mengikut kriteria-kriteria yang digunakan oleh fakulti. Dari siasatan yang dibuat, pemilihan penyelia latihan industri boleh ditakrifkan sebagai peruntukan bagi membentuk penyelia kepada pelajar latihan industri dari FTMK dengan kekangan tertentu untuk dipenuhi. Dengan menggunakan pendekatan algoritma genetik, faktor-faktor keutamaan bagi tugas pemilihan penyelia fakulti yang kepada pelajar latihan industri berkenaan telah dikenalpasti dan juga pelaksanaan pembangunan model untuk memenuhi kriteria pemilihan yang ditetapkan oleh pihak FTMK. Keputusan daripada hasil model pemilihan yang dibangunkan boleh digunakan bagi pengesahan data melalui data sebenar dalam pemilihan penyelia latihan industri di FTMK, UTeM.*

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## LIST OF ABBREVIATIONS

ABBREVIATIONS	TITLE	PAGE
AI	Artificial Intelligent	61
CLP	Constraint Logic Programming	12
FTMK	Fakulti Teknologi Maklumat dan Komunikasi	2
GA	Genetic Algorithm	2
HC	Hard Constraint	25
ILP	Integer Linear Programming	12
IP	Integer Programming	12
JRE	Java Runtime Environment	31
SC	Soft Constraint	25
SFFS	Sequential Forward Floating Selection	17
SFS	Sequential Forward Selection	17
TS	Tabu Search	12
UTeM	Universiti Teknikal Melaka Malaysia	1
VVIP	Very-very Important Person	58

# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 Background of the Study**

An internship can be an opportunity to adhere career related experience into an undergraduate education by associating in planning and supervised work. In Malaysia universities, especially Universiti Teknikal Melaka Malaysia (UTeM), the internship has been conducted and organized by a committee of the faculty. The committee assists undergraduate students with adventures to gain experience in a variety of internships either in the private or public sectors.

The internship program involves two supervisors consisting of a lecturer in institutions and a worker from organizations for monitor development of students to get something useful in their internship program. The student will find the suitable company or organization to get experience in their education, then the committee will assigns preferred lecturer to become the student university supervisor who's will has a reflection and assessment process at the evaluation of the internship. The internship program for undergraduates student will takes 24 weeks to complete.

As mentioned above, internship in UTeM, especially in Fakulti Teknologi Maklumat Dan Komunikasi (FTMK) conducted by the committee. The committee will assign the supervisor to a student manually based on history report in previous years. The committee will select the supervisor with the criteria decided by the faculty. The process to assign a supervisor may be difficult due to the criteria must fulfill. As a human, it can be a mistake in choosing the supervisor based on criteria decided.

So, there have been a number of approaches proposed over the years that aim at helping the committee to decide on various technical factors such as numbers of student, location of the company as well as availability of a supervisor, with most of the techniques proposed tackling scheduling and selection as an optimization problem. Many researchers have focused on using techniques found in the area of computational intelligence, as these have been proven to be extremely efficient for solving real-world problems. These have been adopted mainly due to their abilities to reduce problem search spaces as well as to effectively handle NP-hard problems.

Genetic algorithms (GAs) are search considerations executed by the mechanisms of natural adaptation. They simulate the evolutionary process, and have a simple operation. They were defined by Holland in 1975, and have been extensively studied and used in real-world applications. GAs is considered attractive in many fields due to their robustness, simplicity and the variety of solutions they find.

GAs starts with a population of random individuals, where each individual encodes a solution to the problem in hand. Through procedures that model survival of the fittest concepts,



solutions with higher utility will have preference in producing or spring. After some time this has a tendency to prompt better individuals typically being found.

## **1.2 Problem Statements**

Internship supervisors, one of serious educators in universities. As an experienced, the supervisor teaches interns the system, how doing their job effectively and give constructive criticism during their internship. The main point of the internship program that what student learn in class is not always applied the way they expect in the real world. To ensure student success in their internship supervisor involvement is very important. Each supervisor will be allocated a number of students to be supervised. The selection of the relevant supervisors and experienced is one thing that should be emphasized.

The internship committee still does the selection of supervisors by manually. As a human being, is a difficult task in assignment a faculty supervisor while trying to fulfill all the supervisor preferences. In addition, the committee also needs to meet the criteria for the selection of internship supervisor that has been specified by the faculty such as the committee should ensure that the supervised area or state of internship supervisors history prior to this so as not to overlap. This scenario needs to be faced by the committee with the manual task where it takes a time consuming and do not very accurate.

## **1.3 Research Questions**

From the problem statements has been described in an earlier section, the research questions stated as follows:

1. What are the factors involving in the selection, internship supervisor?
2. How to develop genetic algorithm model to select internship supervisors?
3. How accurate is a genetic algorithm model being able to solve this problem?

#### **1.4 Research Objectives**

In this study, the research objectives can be describe as follows:

1. To identify priority factors in assigning faculty supervisor to internship student.
2. To develop a model of selection of faculty supervisor for internship students using GA.
3. To verify the model with an actual data on selection of internship supervisor.

#### **1.5.1 Research Scope and Limitation**

The ethical and privacy issues as main of consideration in this research. Official approval from the Universiti Teknikal Melaka, Malaysia was obtained to have an access to the related information for the depths practice of analysis and knowledge revilement purposes. For an assure privacy, whole individuals and personal data extract from the information before imploring the genetic algorithm. The scopes of the study area:

1. Using Internship program in Fakulti Sistem Komunikasi Dan Maklumat, Universiti Teknikal Melaka, Malaysia to see a selection of internship supervisor behavior pattern.
2. Using the genetic algorithm model to analyze the information about the internship supervisor selection and measure their priority.

3. Propose an optimized allocation of internship supervisor for the intern undergraduate student based on the criteria.

### **1.5 Significant and Research Contribution**

This research can offer a significant contribution towards the research of the genetic algorithm area and helping the internship committee in doing supervisor selection automatically and efficiently. This is due to by having a final result towards the internship supervisor selection of a fair and appropriate having regard to all factors that are found during the analysis carried out.

This research output can be used by the internship committee of UTeM, especially in FTMK where it can optimize allocation of internship supervisor. In another way, this research also can help in the allocation faculty supervisor for internship student. Furthermore, the task of the committee will fasten a process of allocation.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The genetic algorithm approach in selecting internship supervisors on studying, reviewing and examining was literature review focuses in this study. The first section starts with a brief introduction to an internship program and undergone with Genetic Algorithm. Then, this section continues by reviewing the existing literature in terms of other techniques used in supervisor selections besides than Genetic Algorithm. Finally, the last section consider the selection supervisor internship approach which is going to be carried out in this study.

#### **2.2 Internship**

An industrial training or internship program is viewed as basic to be included in the university curriculum especially for undergraduate courses. More undergraduate student and organizations mindful of the advantages of internship experiences obtained during industrial training by making piece of a course program. It has been accounted for that undergraduate student progressively request internship programs so they can gain proficient abilities before searching for work, in the meantime, organizations use internships to reduce instability in the

procuring process after graduation (Vairis et al., 2013). Thus, internships serve the needs of three gatherings: students, academic institutions and organizations or agencies.

Sivananda et al. (2009) describe internship as *“Students pursuing their education are offered to spend a specific period of time in an organization to take up projects as part-fulfillment of their courses. They are mentored by experienced personnel in the organization as well as by their faculty guides. This brings about a merger of conventional academic knowledge with the experience of practical application in an organization. Encouraging results have been realized by all associated parties with this relationship.”*

According to Sabag et al. (2006), an scholarly teaching emphasizes student scholastic achievements, but solitary academic enhancement does not promise success in the workplace, additionally not within the demanding high-tech surroundings. Current society needs employees to own varied attributes, in along with to professional proficiency. These embrace problem solving capabilities, interpersonal communication, tenacity, self-study, maintaining current on technological developments, etc.

Nowadays, the Malaysian government has aspiration to produce graduates who are good in both technical and non-technical skills workers especially graduates from universities. The government has been very cautious with the difficulty of jobless graduates which has been broadly debated. These abilities are a set of personal acknowledges which consist of expression skills, problem determining, team functioning, critical figuring, leadership, management skills, and prolonged learning capability. Due to, there are growing demands for graduates to be prepared with more than just technical skills.

For extracurricular experiential learning practice the internship has been regarded in literature as a way for undergraduate students to gain real-life experiences, for training purposes, and as a tool to identify long-term interests and goals. By going through internships, undergraduate students can become self-sufficient, motivated, and determined. They begin to clearly while increasing their reported identify career interests, satisfaction with their undergraduate course (Vairis et al., 2013).

Idrus et al. (2010) found the Malaysia national curriculum emphasizing the programs granted in universities, the mission and vision, main curricula also syllabi are co-operating efforts by the government and universities to distributor towards generating competent workforce. Furthermore, another approach to be appraised is the industrial internship. The internship program is a pursuit by universities in association with industries to train and the developers of the wished workforce.

All universities in Malaysia require undergraduates to undergo an internship program for several months. Undergraduates would gain a first-hand experience of the working environment before complete their courses. The undergraduate students might apply the skills, which they have learned at the university, technical or non-technical in the working environment. The industrial internship program also could assess undergraduates' soft skills.

The Industrial Internship Program is a part of the curriculum for courses offered by the university. Students are to undergo twenty four (24) weeks of industrial internship training during fourth during the first semester of fourth year. The Industrial Internship Program will be monitored by lecturers in the various technical disciplines besides the superiors at the respective industry that they are attached to. Undergraduate students expected to integrate their theoretical,

technical and business knowledge while undergoing the internship program. The Industrial Internship Program of each student is monitored by identifying lecturers in the various technical disciplines apart from the students being supervised by line superiors at the respective business organizations that they are attached to.

The aim of internship programs are to show undergraduates to the approaches of problem solving, bringing creative opinions, as well as practice through exercises and conflicts in the present job field. On the other hand, it provides opportunities for industries to recognize the intensity and ability of the undergraduates in addition and train them to become positive thinkers, innovative individuals, knowledgeable workers and excellent communicators.

The main process involves in the internship program is the selection of supervisors. There are two supervisors to monitor undergraduate student during the period. First supervisor is from the company or agencies and second supervisor are from the lecturer in institutions for monitor development of students in the industry.

As mentioned before, internship in UTeM, especially in FTMK conducted by the committee. The committee will assign the supervisor to a student manually based on history report in previous years. The committee will select the supervisor based on the criteria decided by the faculty. The process to assign a supervisor may be difficult due to the criteria must be fulfilled. Mistaken occasionally happen during the process of selecting the supervisor based on criteria decided.

To overcome the problem, an automatic internship program supervisor selection should be developed. By using the automatic system, all the required criteria for selection of a

supervisor will be considered. Besides that, the system also will consider the requests from the internship program supervisor.

So, there have been a number of approaches proposed over the years to help the committee based on various technical factors such as numbers of student, location of the company as well as availability of a supervisor. Most of the techniques proposed are to tackle scheduling and selection as an optimization problem.

### **2.3 Scheduling**

There are many studies about staff scheduling with various names, e.g., shift scheduling, nurse scheduling or rostering. Although, the most studies focus different jobs of working styles individually, each of them proposes a solution approach for a particular job (Ohara and Tamaki, 2012). In addition, if one such approach is used in actual workspaces, it is necessary also to decide peculiar values of the model parameters according to the place. Only a person who has made schedules knows in detail about parameters, so that the person sets up them at great effort.