Mona Maghraby

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني

Mona Maghraby

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

MULTI-OBJECTIVE OPTIMIZATION MEASURES: A COMPARATIVE ANALYSIS

By

Abdel-Rahman Ali Mohamed Ahmed

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
In
MECHANICAL DESIGN & PRODUCTION ENGINEERING

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

Prof. Dr. Mohamed H. Gadallah

……..

Professor of Industrial Engineering, Mechanical Design & Production Department, Faculty of Engineering, Cairo University.

Associate Prof. Hesham A. Hegazi

……..

Associate Professor of Mechanical Design, Mechanical Design & Production Department, Faculty of Engineering, Cairo University.

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Approved by the
Examining Committee

_____
Prof. Dr. Mohamed H. Gadallah, **Thesis Main Advisor**

_____
Associate Prof. Hesham A. Hegazi, **Advisor**

_____
Prof. Dr. Sayed M. Metwalli, **Internal Examiner**

_____
Prof. Dr. Omar M. Saad, **External Examiner**
(Faculty of Science, University of Helwan)

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2019

Dedication

To My Mother whose memory lingers

Engineer's Name: Abdel-Rahman Ali Mohamed Ahmed
Date of Birth: 16/04/1975
Nationality: Egyptian
E-mail: abdelrahman.ali2@yahoo.com
Phone: +201210241299
Address: District #11 , 6 October City , Giza

Registration Date: 1/10/2013
Awarding Date: …/…./……..
Degree: Master of Science
Department: Mechanical Design & Production Department

Supervisors: **Prof. Mohamed H. Gadallah**
Associate Prof. Hesham A. Hegazi

Examiners:

Prof. Dr. Omar M. Saad **(External examiner)**
(Faculty of Science- University of Helwan)
Prof. Dr. Sayed M. Metwalli **(Internal examiner)**
Prof. Mohamed H. Gadallah **(Thesis main advisor)**
Associate Prof. Hesham A. Hegazi **(Advisor)**

Title of Thesis:

Multi-objective Optimization Measures: A Comparative Analysis

Key Words:

Multi-Objective Optimization; Evolutionary Algorithms; Quality Metrics; Multi-Objective Optimization Indices; Penalty Function.

Summary:
The purpose of this thesis is to make a comparative analysis between a set of quality indices using a set of benchmark problems of different natures, type of constraints, number of decision variables, and different number of objective functions. Two famous optimization algorithms NSGA II [1], and SPEA 2 [2] well known are coded and used for solution of optimization problems. Some quality Indices are dependable and changeable according to the problem nature, number and type of constraints, number of decision variables, and number of objective function for optimization. Some quality Indices are eliminated and not significant in measuring the quality of optimization problems. Results indicate that Regular optimization algorithms are not able to handle constrained functions. Modification of the selection strategies for Genetic Algorithm can lead to set trade off solutions as close to Pareto over the entire objective space, and The modified NSGA II (M-NSGA II) is better than regular NSGA II or NSGA II with Penalty function approach with respect to both convergence and diversity. All Pareto front are evaluated in terms of 12 Quality Measures developed [1, 2, and 3]. These 12 Measures are then reduced to seven meaningful Quality indices. Benchmark problems with 2 and 3 objectives subject to equality and inequality constraints are employed.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Date:

Signature:

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Biographies

Mohamed H. Gadallah, Technical Advisor, Education Development Fund (EDF) - The Egyptian Cabinet of Ministers, Professor of Industrial Engineering & Operations Research, Faculty of Engineering, Cairo University 12613, Tel (Office): +202-35678165, Fax: +202-35693025, Cell: + 0122-213-9310, +0109-760-2342
Email: mohamed@aucegypt.edu, mhg@eng.cu.edu.eg, http://staff.eng.cu.edu.eg/mhg, https://aucegypt.academia.edu/MohamedHGadallah, http://scholar.cu.edu.eg/mgadallah

Hesham A. Hegazi, Associate Professor, Mechanical Design & Production Department, Faculty of Engineering, Cairo University, Email: hhegazi@aucegypt.edu

Abdel Rahman Ali M. Ahmed, Master Student, Mechanical Design & Production Department, Faculty of Engineering, Cairo University, E.mail: abdelrahman.ali2@yahoo.com

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