Universitat de Girona

Doctoral Thesis

WORD-METRIC-BASED GREEDY ROUTING FOR CAYLEY GRAPHS

DANIELA AGUIRRE GUERRERO

2018

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2018

Doctoral Program in Technology

Supervised by:
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Thesis submitted to the University of Girona in fulfillment of the requirements for the degree of Doctor of Philosophy

CERTIFICAT DE DIRECCIÓ DE TESI

Dr. Pere Vilà Talleda and Dr. Lluís Fàbrega Soler, del Departament d'Arquitectura i Tecnologia de Computadors de la Universitat de Girona,

DECLAREM:

Que el treball titulat *Word-Metric-based Greedy Routing for Cayley Graphs*, que presenta Daniela Aguirre Guerrero per a l'obtenció del títol de doctor, ha estat realitzat sota la nostra direcció i que compleix els requisits per poder optar a Menció Internacional.

I, perquè així consti i tingui els efectes oportuns, signem aquest document.

Girona, Juliol 2018

Dr. Pere Vilà Talleda

Dr. Lluís Fàbrega Soler

ACKNOWLEDGMENTS

PUBLICATIONS

The work developed in this thesis led to the following publications:

JOURNAL ARTICLES

[1] **D. Aguirre-Guerrero**, M. Camelo, P. Vilà and Ll. Fàbrega, "WMGR: A Generic and Compact Routing Scheme for Data Center Networks," in *IEEE/ACM Transactions on Networking*, vol. 26, no. 1, pp. 356-369. Feb. 2018. DOI: 10.1109/TNET.2017.2779866

PEER-REVIEWED CONFERENCES AND WORKSHOPS

[1] **D. Aguirre-Guerrero**, M. Camelo, P. Vilà and Ll. Fàbrega, "Compact Greedy Routing in Large-scale Networks using Word-metric Spaces," *1st. International Workshop on Elastic Networks Design and Optimization*, Cartagena, Spain, 2016.

OTHER CONFERENCES AND WORKSHOPS

[1] **D. Aguirre-Guerrero**, P. Vilà and Ll. Fàbrega, "Encaminamiento de Información en Redes Comunicación de Gran Escala," *6to. Simposio de Becarios CONACyT en Europa*, Strasbourg, France 2017.

[2] **D. Aguirre-Guerrero**, P. Vilà and Ll. Fàbrega, "Greedy Geometric in Word Metric Spaces," *1st. Conference of Pre-doctorals Researches*, Girona, Spain, 2016. ISBN: 978-8-48458-502-2

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ACRONYMS

WMGR word-metric based greedy routing

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ABSTRACT

Since word-metric based greedy routing (WMGR) *a priori* (e.g., exploring confined natural environments like underwater caves). In these scenarios, WMGRs

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Part I

PRELIMINARIES

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1 INTRODUCTION

1.1 MOTIVATION

1.2 PROBLEM STATEMENT

1.3 OBJECTIVES

1.4 CONTRIBUTIONS

1.5 HOW TO READ THIS THESIS

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2.1 GRAPH THEORY

2.2 FINITE STATE AUTOMATA

2.2.1 *Regular Languages*

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2.2.3 *Existential Quantification*

2.3 GROUP THEORY

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2.3.2 *Group Homomorphism*

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2.3.4 *Cayley Graphs*

2.4 AUTOMATIC GROUPS

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3.2.1.1 *Processor Interconnection Networks*

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3.2.1.3 *Wireless Sensor Networks*

3.2.2 *Error Correcting Codes*

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3.3 ROUTING ALGORITHMS

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Part II

WORD-METRIC-BASED GREEDY ROUTING

You can put some informational part preamble text here. Illo principalmente su nos. Non message *occidental* angloromanic da. Debitas effortio simplificate sia se, auxiliar summarios da que, se avantiate publicationes via. Pan in terra summarios, capital interlingua se que. Al via multo esser specimen, campo responder que da. Le usate medical addresses pro, europa origine sanctificate nos se.

4 PATH COMPUTATION IN CAYLEY GRAPHS

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6.3 FORWARDING DESICION TIME

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6.5 MESSAGE COMPLEXITY

6.5.1 *Node Label Assigment*

6.5.2 *Failures Notification*

6.5.3 *Recovery Notification*

7 CONCLUSIONS

7.1 SUMMARY OF COMPLETED WORK

This thesis has addressed the problem of

7.2 REVIEW OF CONTRIBUTIONS

7.3 FUTURE WORK

APPENDIX