

Dr. FLABIO ALFONSO GUTIÉRREZ SEGURA



RENACYT researcher P0021770



Renacyt researcher web site:

http://dina.concytec.gob.pe/appDirectorioCTI/VerDatosInvestigador.do?jsessionid=0a57f731d8f19e91a96dd3446392?id_investigador=21770

Web site: <https://flabiogutierrez.wordpress.com>

Scientific identifiers: [Orcid](#) [ResearchId](#) [ScopusID](#) [scholar google](#)

PERSONAL DATA

Nationality: Peruvian

Professor at the National University of Piura (UNP) - Peru.

Science Faculty

Department of Mathematics.

email: flabio@unp.edu.pe

RESEARCH LINES

Artificial Intelligence, Intelligent Systems, Fuzzy Optimization, Neural Networks, Metaheuristics.

I. ACADEMIC DEGREES

- 1.1 Doctor of Mathematics (National university of Trujillo - Peru).
- 1.2 Doctor (c) in Computer Science (Universidad Politécnica de Valencia - Spain).
- 1.3 Magister in Applied Mathematics (National University of Piura - Peru)
- 1.4 Magister in Computer Science (University of Cantabria - Spain)
- 1.4 Bachelor of Mathematics (National university of Trujillo - Peru).

II. MANAGEMENT

- 2.1 Coordinator of the Master in Applied Mathematics (2001 – 2011) (2016 – may 2019)
- 2.2 Head of the Computer and Telecommunications in the Piura National University (2002 – 2006)

III RESEARCH PROJECTS

3.1 Proyecto: “Consulting for the design and writing of the study development of intelligent techniques for solving problems of sustainable scheduling”.

National University of Piura. Program: Minedu. Amount: \$ 11,756. Period: 2019

3.2 Proyecto: “*Design and implementation of an intelligent system for tourist orientation in the city of Tumbes – Peru*”.

National University of Tumbes – National University of Piura. Program: Canon and Sobre Canon National University of Tumbes. Amount: \$ 14, 658.46. Period: 2019 – 2020.

3.3 Proyecto: “*Heuristic models and meta for routing the process of product distribution and solid waste collection-transportation in the context of urban logistics*”. National university of Trujillo – National University of Piura. Program: FONDECYT. Amount: \$ 73,810.61. Period: 2019 – 2021.

3.4 Proyecto: “*Robustness, model stability and fuzzy optimization methods*”. National university of Trujillo – National University of Piura. Program: FINCYT. Amount: \$ 513,585.00. Period: 2015 – 2018.

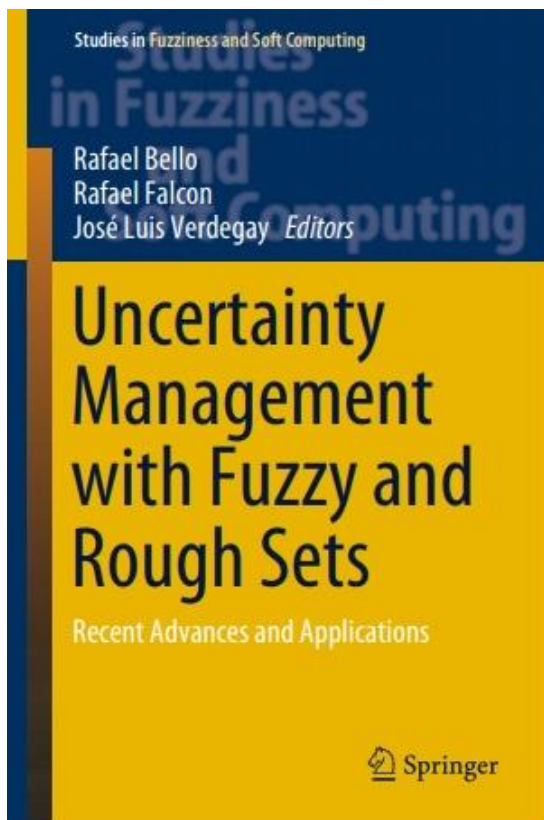
3.5 Proyecto “Simulation and performance monitoring system of thermoelectric plants”. National Autonomous University of Mexico (UNAM). Program: Central Federal de Electricidad (CFE). Amount: \$ 800,000. Period: 2008 – 2009.

3.6 Project: "Intersection algorithms for geometry based IT- applications using approximate algebraic methods started". University of Cantabria (Spain). Program: European Union. Amount: \$1'500, 000 euros. Period: 2002 - 2005.

IV. BOOKS AND BOOK CHAPTERS

4.1 Chapter 5 of the book “Uncertainty Management with Fuzzy and Rough Sets” (pages 87 - 114). Springer (Germany) 2019. (Indexed in Scopus)

<https://www.springer.com/gp/book/9783030104627>



Fully Fuzzy Linear Programming Model for the Berth Allocation Problem with Two Quays



Flabio Gutierrez, Edwar Lujan, Rafael Asmat and Edmundo Vergara

Abstract In this work, we study the berth allocation problem (BAP), considering the cases continuous and dynamic for two quays; also, we assume that the arrival time of vessels is imprecise, meaning that vessels can be late or early up to a allowed threshold. Triangular fuzzy numbers represent the imprecision of the arrivals. We present two models for this problem: The first model is a fuzzy MILP (Mixed Integer Lineal Programming) and allows us to obtain berthing plans with different degrees of precision; the second one is a model of Fully Fuzzy Linear Programming (FFLP) and allows us to obtain a fuzzy berthing plan adaptable to possible incidences in the vessel arrivals. The models proposed have been implemented in CPLEX and evaluated in a benchmark developed to this end. For both models, with a timeout of 60 min, CPLEX find the optimum solution for instances up to 10 vessels; for instances between 10 and 65 vessels it finds a non-optimum solution and for bigger instants no solution is founded. Finally we suggest the steps to be taken to implement the model for the FFLP BAP in a maritime terminal of containers.

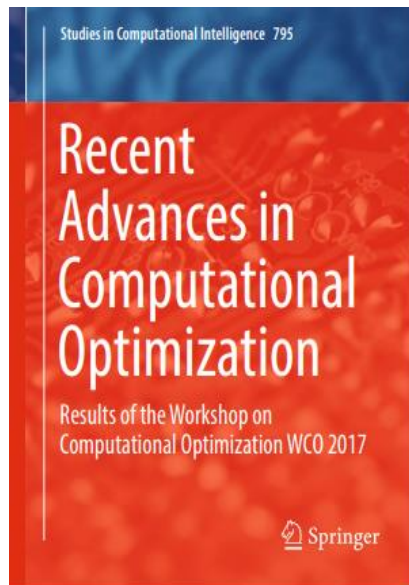
1 Introduction

The maritime transport of containers continues to increase mainly because of the ease to carrying the goods as well as the large quantity of containers that vessels can transport. During the year 2016, for instance around 701 420 047 TEUs (Twenty-foot

F. Gutierrez (✉)
Department of Mathematics, National University of Piura, Piura, Peru
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4.2 Chapter 10 of book “Recent Advances in computational optimización” (paginas 149 -174). Editorial Springer (Germany) 2019. (Indexed inScopus).

<https://www.springer.com/us/book/9783319996479>



Fuzziness in the Berth Allocation Problem



Flabio Gutierrez, Edwar Lujan, Rafael Asmat and Edmundo Vergara

Abstract The berth allocation problem (BAP) in a marine terminal container is defined as the feasible berth allocation to the incoming vessels. In this work, we present two models of fuzzy optimization for the continuous and dynamic BAP. The arrival time of vessels are assumed to be imprecise, meaning that the vessel can be late or early up to a threshold allowed. Triangular fuzzy numbers represent the imprecision of the arrivals. The first model is a fuzzy MILP (Mixed Integer Lineal Programming) and allow us to obtain berthing plans with different degrees of precision; the second one is a model of Fully Fuzzy Linear Programming (FFLP) and allow us to obtain a fuzzy berthing plan adaptable to possible incidences in the vessel arrivals. The models proposed has been implemented in CPLEX and evaluated in a benchmark developed to this end. For both models, with a timeout of 60 min, CPLEX find the optimum solution to instances up to 10 vessels; for instances between 10 and 45 vessels it find a non-optimum solution and for bigger instants no solution is founded.

1 Introduction

Research that seeks to determine the optimal solution to the Berth Allocation Problem (BAP)

4.3 Editor of book “Advances in Artificial Intelligence”. Springer (Germany) 2018. (Indexed in Scopus).

<https://link.springer.com/book/10.1007/978-3-030-03928-8>



V INTERNATIONAL PAPERS

5.1 Asmat, R., Vergara, E., & Gutiérrez, F. (2019). "Robustness and stability measures for scheduling problems with uncertainty: A review of the state of the art". *Selecciones Matemáticas*, 6(02), 297-310. (Indexed in Latindex).

<http://revistas.unitru.edu.pe/index.php/SSMM/article/view/2638/2656>

5.2 Gutierrez F., Lujan E., Asmat R., Vergara E. "A Fully Fuzzy Linear Programming Model for Berth Allocation and Quay Crane Assignment". *Advances in Artificial Intelligence - IBERAMIA 2018. Lecture Notes in Computer Science*, vol 11238. Springer (Germany), pages 302 – 313. (2018). (Indexed in Scopus).

https://link.springer.com/chapter/10.1007/978-3-030-03928-8_25

5.3 Jiménez-Carrión, M., Gutiérrez-Segura, F., & Celi-Pinzón, J. "Modeling and Prediction of the El Niño Phenomenon in Piura, Peru through Artificial Neural Networks using Matlab". *Información tecnológica*, 29(4), 303-316. (2018). (Indexed in Scopus).

<https://scielo.conicyt.cl/pdf/infotec/v29n4/0718-0764-infotec-29-04-00303.pdf>

5.4 Flabio Gutiérrez, et al. "A fully fuzzy linear programming model to the berth allocation problem." *Computer Science and Information Systems (FedCSIS)*, 2017 Federated Conference on. IEEE, (2017). (Indexed in Scopus).

<https://annals-csis.org/proceedings/2017/drp/pdf/339.pdf>

5.5 Gutiérrez, F., Vergara, E., Rodríguez, M., & Barber, F. S. *Un modelo de optimización difusa para el problema de atraque de barcos*. *Investigación operacional*, 38(2), 160-170. (2017). (Indexed in Scopus).

<http://www.invoperacional.uh.cu/index.php/InvOp/article/view/540>

5.6 Lazo Eche, Edwin, Flabio Gutiérrez Segura, and Edmundo Vergara Moreno. "An efficient algorithm for single machine problems with fuzzy processing times." *Revista Cubana de Ciencias Informáticas* 10.4 p. 139-153. (2016). (Indexed in Scielo Cuba).

http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2227-18992016000400010

5.7 Arroyo, E. M., Moreno, E. V., Segura, F. G., & Uceda, R. A. “*Linear optimization models and methods with uncertainty: A brief review of the state of the art*”. *Selecciones Matemáticas*, 2(02), p. 9-16. (2015). (Indexed in Latindex).

<http://revistas.unitru.edu.pe/index.php/SSMM/article/viewFile/1236/1134>

5.8 Segura, E. L., Segura, F. G., Moreno, E. V., & Uceda, R. A. (2015). “*Scheduling With Uncertainty*”. *Selecciones Matemáticas*, 2(02), p. 38-48. (2015). (Indexed in Latindex).

<http://revistas.unitru.edu.pe/index.php/SSMM/article/viewFile/1238/1136>

5.9 Puig-Pey, J., Gálvez, A., Iglesias, & Gutiérrez, F. *Some applications of scalar and vector fields to geometric processing of surfaces*. *Computers & Graphics*, 29(5), 719-725. (2005). (Indexed in Scopus)

<https://www.sciencedirect.com/science/article/pii/S0097849305001342>

VI INTERNATIONAL CONFERENCES

6.1 First International Conference on Smart Technologies, Systems and Applications - SmartTech-IC 2019.

Salesian Polytechnic University (Ecuador) - December 2019

<http://www.smartechic.org/>

Lecture: “A Genetic Algorithm for BAP + QCAP with imprecision in the arrival of vessels”.

<http://www.smartechic.org/program.html>

6.2 14° Inter-American Congress of Computing Applied to the Process Industry – CAIP 2019.

Pontificia Universidad Católica del Perú – October 2019.

Lecture: “*Modelo Fuzzy para el Problema de Asignación de Atraques y Grúas en n-Muelles*”.

<http://congreso.pucp.edu.pe/caip2019/sobre-el-evento/actas/>

6.3 16th Ibero-American Conference on Artificial Intelligence. – IBERAMIA 2018. National university of Trujillo (UNT) – Perú. November 2018.

Lecture: “*A Fully Fuzzy Linear Programming Model for Berth Allocation and Quay Crane Assignment*”.

https://link.springer.com/chapter/10.1007/978-3-030-03928-8_25

6.4 Latin-Iberoamerican Conference on Operations Research – CLAIO 2018. Lima Convention Center - Perú. September 2018.

<http://www.sopios.org.pe/claio2018>

Lecture: “*A genetic algorithm to handle imprecision in the berth and crane allocation problem*”.

6.5 III Data Science & Engineering Consortium Meeting. Catholic University San Pablo (UCSP). Arequipa – Peru. July 2018.

<http://ucsp.edu.pe/ciet/dsec/>

Lecture: “*Treatment of uncertainty in machine learning*”.

6.6 2nd International Symposium on Fuzzy and Rough Sets (ISFUROS 2017). Varadero - Cuba. October 2017.

<http://www.site.uottawa.ca/~rfalc032/isfuros2017/>

Lecture: “*A fuzzy optimization model in the allocation of ship berths with delayed arrivals in a two-quay port*”.

6.7 Federated Conference on Computer Science and Information Systems (FedCSIS 2017). Praga – Republica Checa. September 2017.

Lecture: “*A fully fuzzy linear programming model to the berth allocation problem*”.

<https://annals-csis.org/proceedings/2017/drp/pdf/339.pdf>

6.8 XXVI Capricorn Mathematics Congress (COMCA 2017). Arica – Chile. August 2017.

Lecture: “*Evolution of solution methods for fuzzy mathematical programming problems*”

6.9 II International Workshop Seminar on Globalized Methods of Mathematics: Research and Teaching Problems. National university of Trujillo (UNT) – Perú. February 2017.

Lecture: “*A fuzzy optimization model for single machine problems*”.

<http://mateapliunt.edu.pe/globalmath/>

6.10 II International Workshop Seminar on Globalized Methods of Mathematics: Research and Teaching Problems. National university of Trujillo (UNT) – Perú. February 2017.

Lecture: “*Construction of fuzzy sets using artificial intelligence techniques*”.

<http://mateapliunt.edu.pe/globalmath/>

6.11 II International Scientific Conference UCIENCIA 2016. Informatic science University (UCI). La Habana – CUBA. November 2016.

<https://www.uci.cu/universidad/noticias/uciencia-2016>

Lecture: *“An efficient algorithm for single machine problems with fuzzy processing times”*.

6.12 I International Seminar on Fuzzy Optimization for Innovation I-SIODI. National university of Trujillo (UNT) – Perú. February 2016.

<https://es-la.facebook.com/pages/category/College—University/I-Siodi-2016-176567142687034/>

Lecture: *“Robustness, model stability and fuzzy optimization methods applied to scheduling problems”*.

6.13 VII International Congress of Applied and Computational Mathematics. National university of Trujillo (UNT) - Perú. October 2014.

Lecture: *“Fuzzy scheduling”*

6.14 I Information and communication technology congress CIS-UNL 2014. National University of Loja – Ecuador. 05 de junio 2014.

<https://sites.google.com/a/unl.edu.ec/tic-cisunl2014/Conferences>

Lecture: *“Neural Networks”*.

6.15 I Binational colloquium on mathematics education. Tumbes National University. Tumbes – Perú. February 2010.

Lecture: *“Use of Mathematical Logic in Artificial Intelligence”*.

6.16 I International Workshop Seminar on Globalized Methods of Mathematics: Research and Teaching Problems. National university of Trujillo (UNT). Trujillo – Perú. January 2010.

Lecture: *“Evolutionary Computing Paradigms”*.

6.17 V International Congress of Systems Engineering. Cesar Vallejo University (UCV). Trujillo – Perú. July 2009.

Lecture: *“Applications of artificial intelligence to medicine”*.

6.18 IX International Automation Symposium. Convention Center. La Habana – Cuba.
February 2009.

<http://www.researchgate.net/publication/270453558>

Lecture: *“Web system for real-time monitoring of the performance of thermoelectric plants”*.

6.19 IV International Congress of Applied and Computational Mathematics - IV CIMAC. Pedro Ruiz Gallo National University (UNPRG). Lambayeque - Perú. September 2008.

Lecture: *“Design and development of a knowledge-based system for the diagnosis of diabetes”*.

6.20 III International Congress of Applied and Computational Mathematics. Universidad Nacional del Callao - Perú. February 2006.

Lecture: *“Calculation of Maxima and Minima of functions of various variables using Genetic algorithms”*.

6.21 III International Congress of Systems Engineering. Cesar Vallejo University (UCV). Trujillo – Perú. July 2005.

Lecture: *“Evolutionary Computing Paradigms”*.

6.22 VII Italian-Latin American Conference on Applied Mathematics and Industry – ITLA 2004. National university of Trujillo (UNT) – Perú. December 2004.

Lecture: *“A genetic algorithm for the plant distribution problem”*.

6.23 VIII Spanish Congress of Applied Mathematics CEMA 2003. Tarragona - España. September 2003.

<https://www.researchgate.net/publication/270582863> Algunas aplicaciones de campos escalares y vectoriales en procesado geométrico de superficies

Lecture: *“Algunas aplicaciones de campos escalares y vectoriales en procesado geométrico de superficies”*.

6.24 II International Congress of Applied and Computational Mathematics – CIMAC II. National University of San Marcos (UNMSM). Lima - Perú. August 2003.

Lecture: *“Applications of differential geometry in the automotive industry”*

6.25 I International workshop geometry workshop research and teaching problems. National university of Trujillo (UNT) – Perú. October 2002.

Lecture: *“Computer Aided Geometric Design: Fundamentals and Applications”*

6.26 II International Congress of Numerical Methods in Engineering and Applied Sciences. Guanajuato – México. January 2002.

[https://www.researchgate.net/publication/242278143 METODOS COMPUTACIONALES PARA IN TERROGACION DE SUPERFICIES NURBS APLICACIONES EN LA INDUSTRIA DEL AUTOMOVIL](https://www.researchgate.net/publication/242278143)

Lecture: *“Computational methods for interrogating nurbs surfaces. Applications in the automotive industry”*.

6.27 XI Spanish Congress of graphic computing. CEIG 2001. Girona - España. July 2001.

[https://www.researchgate.net/publication/270583003 Un modelo para trayectorias de gotas sobre superficies NURBS](https://www.researchgate.net/publication/270583003)

Lecture: *“A model for droplet trajectories on NURBS surfaces”*.

6.28 IX international conference on computer graphics and vision, GRAPHICON 99. Moscú – Rusia. August 1999.

http://www.graphicon.ru/html/1999/Tools%20and%20Techniques/Galvez_Iglesias_Gutierrez.pdf

Lecture: *“Applying MATLAB to Computer Graphics and CAGD. Application to a Visualization Problem in the Automotive Industry”*.

6.29 Eurographics workshop on computer graphics and visualization education, GVE 99. Coimbra - Portugal. July 1999.

<https://media.siggraph.org/education/PDF/GVE99/papers/gve99-a-iglesias.pdf>

Lecture: *“A Mathematica Package for CAGD and Computer Graphics”*.

VII THESIS ADVISORY

THESIS	AUTHOR	DEGREE	THESIS DISSERTATION
Implementation of an Expert System for the diagnosis of type of Diabetes.	Jiménez Vilcherrez Judith Keren.	Master in Applied Mathematics.	22/02/2018
Models and optimization methods for fuzzy scheduling problems on simple machines	Lazo Eche Edwin	Master in Applied Mathematics.	17/03/2017
Construction of fuzzy sets from data	Hidalgo Mendoza Ellis Rodney	Master in Applied Mathematics.	10/02/017
Solving equations and inequalities with imprecise data and variables	Abramonte Rufino Richard Alexander	Master in Applied Mathematics	01/07/2016
Dynamics of Newton's method in the construction of an initialization set to find the roots of polynomials of complex variables	Anastacio Sandoval José Elihu	Master in Applied Mathematics	21/03/2016
Design and implementation of an expert system to guide tourists in the city of Tumbes	Vera Namay Emilio Máximo	Master in Applied Mathematics	29/05/2014
Student performance in the subject of History of Mathematics and proposal of a multimedia board for teaching Mathematics	Rosillo Valladares Justo Ricardo	Maestría en Docencia Universitaria	19/05/2014
Foundations of Bioinformatics	Medina Marchena Agustín	Master in Applied Mathematics	17/05/2012
Implementation of an artificial Neural network model, for the prediction of the liquidity ratio in national currency of the CMAC-Sullana.	Carcamo Cherres Ruth Judith	Master in Applied Mathematics	24/03/2011
Diffuse Expert System for the diagnosis and prognosis of tempomandibular disorders using factor analysis and finite element.	Hananel Baigorria Alberto	Master in Applied Mathematics	21/01/2011
Functions of various real variables in a bounded domain using genetic algorithms with programming in Matlab 6.5	Garcia Saba Manuel Hernan	Master in Applied Mathematics	22/12/2010
Short-term prediction of drinking water demand for the city of Piura, based on neural networks.	Abanto Cerna Lemín	Master in Applied Mathematics	07/10/2010
Introductory Study to Fuzzy Mathematics	Casos Fernández Sonia Alicia	Master in Applied Mathematics	26/01/2008

Homomorphism and isomorphism between finite groups with the application of the scientific software Mathematica	Malaver Lavado, Felipe Wilmer	Master in Applied Mathematics	14/09/2005
Intra-alveolar distribution model of inhaled argon	Caucha Morales Luis Jhony	bachelor's degree in mathematics	2006
Applying geometric design to 3D object animations using cinema 4D software.	Velázquez Fernández Marcela;	bachelor's degree in mathematics	2006
Development of a virtual tour of the environments of the Faculty of Industrial Engineering of the UNP using VRML.	Puicon Zapata Hoover	Computer Engineer degree	2002
Development of an expert disease detection system	Gomez Almestar Edwin	Computer Engineer degree	2001
Applications of Bezier and B-Splines polynomials in the design of curves in plane and space using the computer	Ipanaqué Chero Roberth; Urbina Guzmán Rubén	bachelor's degree in mathematics	July 2000

VIII CONFERENCE ORGANIZATION

8.1 Chair man 16th Ibero-American Conference on Artificial Intelligence. – IBERAMIA 2018. National university of Trujillo (UNT) – Perú. November 2018.

<http://www.iberamia.org/iberamia/iberamia2018/>

8.2 II International Workshop Seminar on Globalized Methods of Mathematics: Research and Teaching Problems. National university of Trujillo (UNT). February del 2017.

<http://www.acmgmat.unitru.edu.pe/index.php/ii-seminario-taller-internacional>

8.3 I International Seminar on Fuzzy Optimization for Innovation I-SIODI. National university of Trujillo (UNT) – Perú. February 2016.

<https://es-la.facebook.com/pages/category/College—University/I-Siodi-2016-176567142687034/>

8.4 IV Peruvian artificial intelligence workshop. National university of Trujillo (UNT). Trujillo, December 2015

https://www.facebook.com/pg/Workshop.ia2015/posts/?ref=page_internal

8.5 VI National Congress of Mathematicians of Peru. Piura – Perú. National University of Piura (UNP). Piura, August 2016.

8.6 XI International Biomatematics Seminar (XI SEMBIOMAT). National University of Piura (UNP). Piura, August 2015.

8.7 VII International Congress of Applied and Computational Mathematics. National university of Trujillo (UNT). Trujillo, October 2014.

8.8 II Peruvian artificial intelligence workshop. Universidad Nacional Santiago Antúnez de Mayolo (UNASAM). Huaraz, October del 2009.

8.9 I Peruvian artificial intelligence workshop. National University of Piura (UNP). Piura, December 2008.

8.10 IV International Congress of Applied and Computational Mathematics. - IV CIMAC. Pedro Ruiz Gallo National University (UNPRG). Lambayeque, September 2008.

IX AWARDS:

9.1 Recognition of research career. National University of Piura. July 2017

9.2 Considered among the 200 best researchers of Peru in 2015. Peruvian scientists ranking SCIMAGO 2015.

9.3 Distinguished Visiting Professor. National university of Tumbes. February 2014

9.4 Scholarship for doctoral studies. European Union. 2011

9.5 Academic and scientific career recognition. Pedro Ruiz Gallo National University. July 2009

9.6 Scholarship for Master's studies. Scholarships ICI – Spain. 1996.

X POSTGRADUATE TEACHING ACTIVITIES

Teacher of Master and Doctorate in Universities:

10.1 National University of Piura (Master in Applied Mathematics, Master in Administration, Master in Computer Science, Master in TICS, Doctorate in Industrial Engineering, Doctorate in TICS, Doctorate in Agricultural Sciences)

10.2 Pedro Ruiz Gallo National University (Master in Computer Science)

10.3 National university of Trujillo (Master in Computer Science)

10.4 Santiago Antúnez de Mayolo University (Huaraz) (Doctorate in Computer Science and Engineering, Master in Computer Science)

XI ACADEMIC SOCIAL NETWORKS

Scholar Google

<https://scholar.google.com/citations?user=Yz9QL98AAAAJ&hl=es>

Linkedin

<https://www.linkedin.com/in/flabio-alfonso-gutierrez-segura-b34a36ab/>

Research Gate

https://www.researchgate.net/profile/Flabio_Gutierrez_Segura

Academia.edu

<https://percy.academia.edu/FlabioGutierrez>