



MASTER DE ESTRUCTURAS

Curso: Optimización y Computación Inteligente

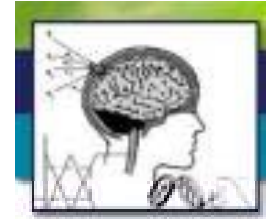
**Miguel Delgado, Francisco Herrera
Ignacio Requena**

**Dpto. Ciencias de la Computación e I.A.
Universidad de Granada
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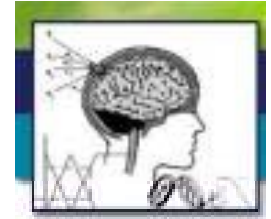
Contenido del Curso



Francisco Herrera
herrera@decsai.ugr.es

Algoritmos Bioinspirados y Evolutivos

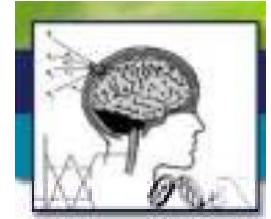
Contenido del Curso



Miguel Delgado
mdelgado@decsai.ugr.es

Lógica Difusa y Sistemas Difusos

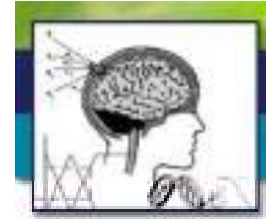
Contenido del Curso



Ignacio Requena
requena@decsai.ugr.es

Redes Neuronales

Evaluación



Evaluación: La indicada por cada profesor

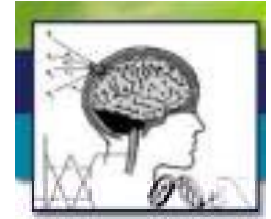
Asistencia al curso: Aprobado

La falta de asistencia se podrá compensar con un trabajo específico acordado con el profesor correspondiente.

Trabajo: Entregarlo a alguno de los profesores del curso, dependiendo de la técnica elegida.

Módulo: Algoritmos Evolutivos y Bioinspirados. Entregar un trabajo que estudie algún artículo sobre la aplicación de alguna o varias técnicas de Soft Computing en algún problema de Ingeniería Civil, para tener una calificación superior.

Contenido del Curso



Francisco Herrera
herrera@decsai.ugr.es

Contenidos

Sesión 1.

1.a. Algoritmos Evolutivos

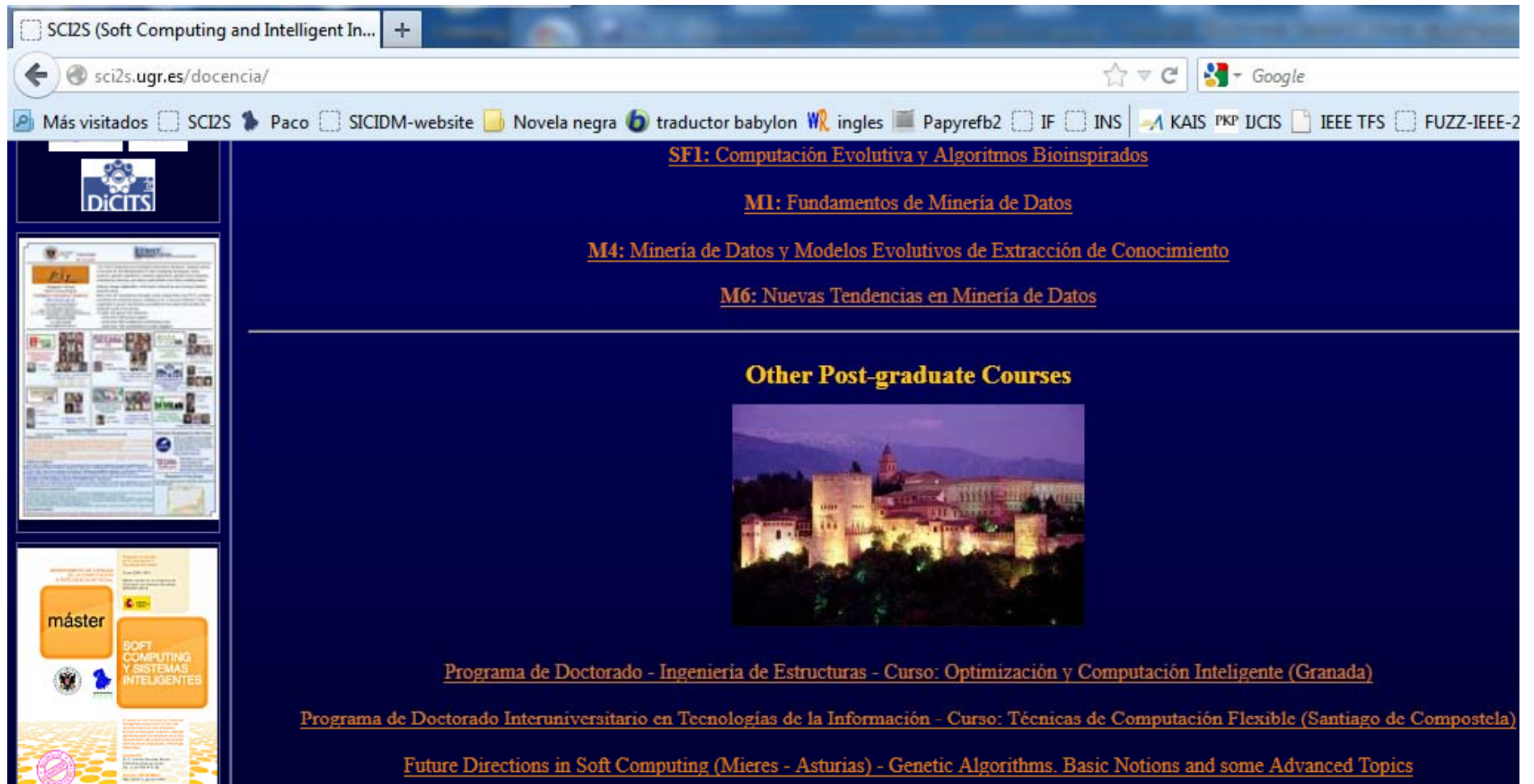
1.b. Introducción a la Investigación

1.c. Cienciometría y Bibliometría. Evaluación de la Producción Científica

Sesión 2. Algoritmos Bioinspirados. Algoritmos de Optimización de Colonia de Hormigas.

F. Herrera


Material: sci2s.ugr.es/docencia



The screenshot shows a web browser window with the address bar displaying sci2s.ugr.es/docencia/. The page content is as follows:

- [SF1: Computación Evolutiva y Algoritmos Bioinspirados](#)
- [M1: Fundamentos de Minería de Datos](#)
- [M4: Minería de Datos y Modelos Evolutivos de Extracción de Conocimiento](#)
- [M6: Nuevas Tendencias en Minería de Datos](#)

Other Post-graduate Courses



- [Programa de Doctorado - Ingeniería de Estructuras - Curso: Optimización y Computación Inteligente \(Granada\)](#)
- [Programa de Doctorado Interuniversitario en Tecnologías de la Información - Curso: Técnicas de Computación Flexible \(Santiago de Compostela\)](#)
- [Future Directions in Soft Computing \(Mieres - Asturias\) - Genetic Algorithms, Basic Notions and some Advanced Topics](#)

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Programa de Doctorado

Curso: Optimización y Computación Inteligente

Curso: Nuevas Tecnologías de la Información en la Ingeniería Civil

Francisco Herrera (Dpto. de Ciencias de la Computación e I.A.)

Documentación

- **Sesión 1.a:** Introducción a los modelos de computación bioinspirados. Inteligencia de Enjambre. Computación Evolutiva. ([PDF, 4153 Kb](#))
- **Sesión 1.b:** Algoritmos Genéticos. ([PDF, 1518 Kb](#))
- **Sesión 1.b (parte II):** Algoritmos Genéticos Multiobjetivo. ([PDF, 406 Kb](#))
- **Código:** Código de Algoritmos Genéticos en Fortran. ([ZIP, 39 Kb](#))
- **¿Cómo se escribe un paper?** ([PDF, 1199 Kb](#))
- **Bibliometría: Evaluación de la ciencia** ([PDF, 2844 Kb](#))

Bibliografía complementaria

- **Swarm Intelligence**
 - S. Garnier, J. Gautrais, G. Theraulaz. The biological principles of swarm intelligence. Swarm Intelligence 1(2007) 3-31. ([PDF, 1936 Kb](#))
 - [S. Alonso](#), [O. Cordón](#), I. Fernández de Viana y [F. Herrera](#). La Metaheurística de Optimización Basada en Colonias de Hormigas: Modelo Nuevos Enfoques. In: G. Joya, M.A. Atencia, A. Ochoa, S. Allende (Eds.), Optimización Inteligente: Técnicas de Inteligencia Computacional

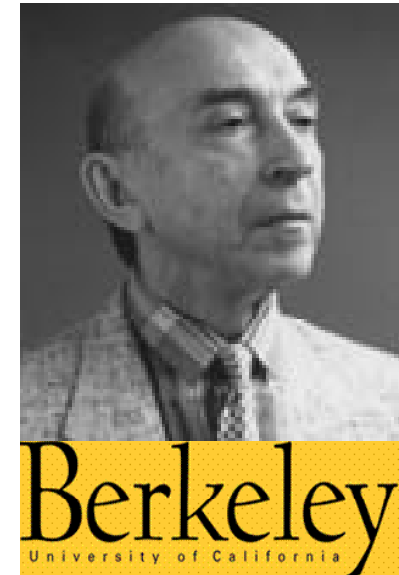


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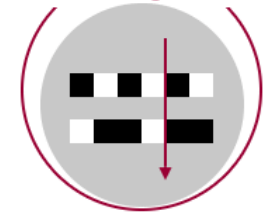
Inteligencia Computacional

también es conocida con
el nombre de

Soft Computing



Lotfi A. Zadeh
Introduce en 1965 la
“**Lógica Fuzzy**”
y en 1992 el término
“**Soft Computing**”.

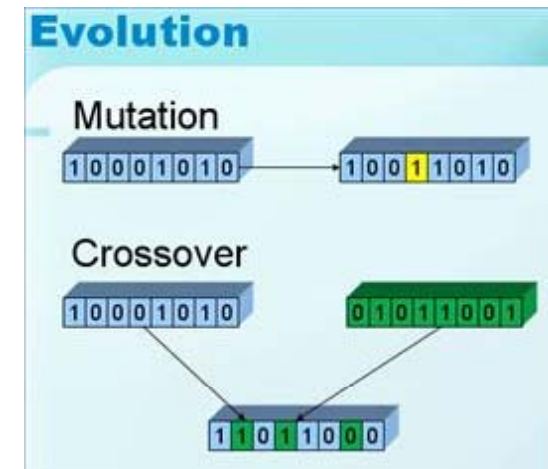


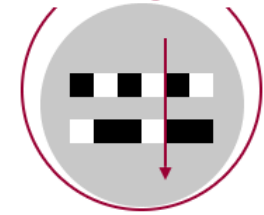
ALGORITMOS GENÉTICOS

ALGORITMOS GENÉTICOS

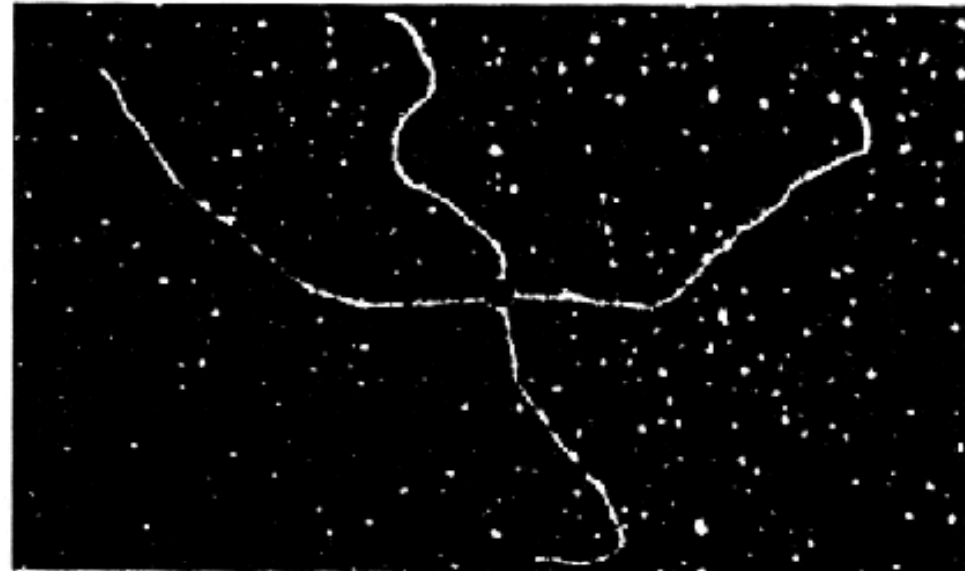
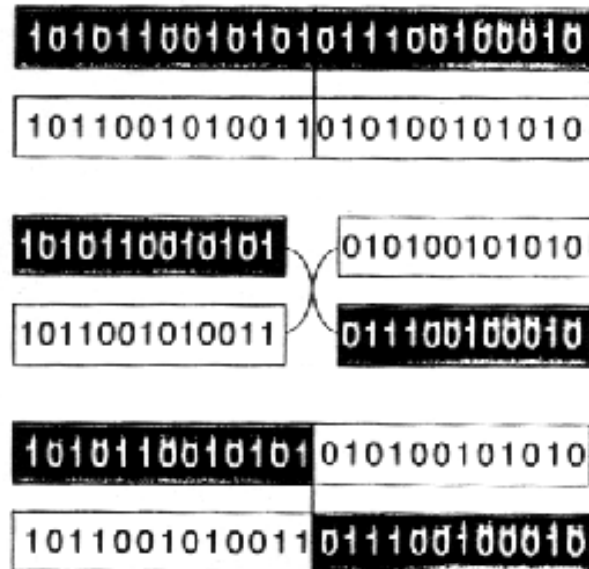
Basados en los principios
Darwinianos de Evolución
Naturaleza

Paradigma de búsqueda y
optimización





ALGORITMOS GENÉTICOS



OUTPUT
GENERATED

CROSSOVER is the fundamental mechanism of genetic re-arrangement for both real organisms and genetic algorithms.

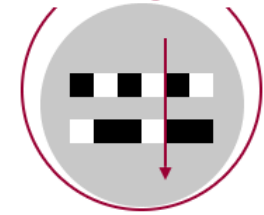
Chromosomes line up and then swap the portions of their genetic code beyond the crossover point.



¿Qué es Inteligencia Computacional?

Áreas de aplicación: Computación Evolutiva

- Optimización
 - * Ingeniería
 - * Diseño
 - * Planificación
- Clasificación y descubrimiento de información de bases de datos



ALGORITMOS GENÉTICOS

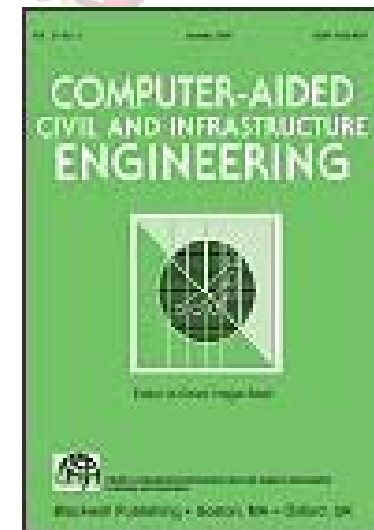
Ingeniería Civil:

Aplicaciones en problemas de optimización

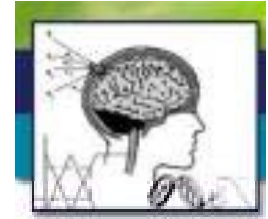
Caso de estudio de publicaciones de una revista científica:

Computer-Aided Civil and Infrastructure Engineering

<http://www.blackwellpublishing.com/>



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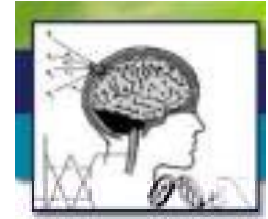
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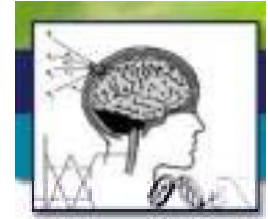
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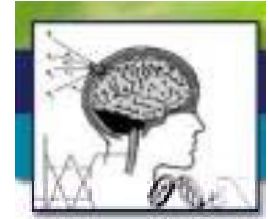
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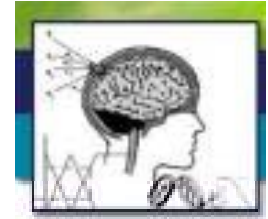
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- Title: **Simulation-Optimization Models for the Dynamic Berth Allocation Problem**
Author(s): Arango, Carlos; Cortes, Pablo; Onieva, Luis; et al.
Source: **COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING** Volume: 28 Issue: 10 Pages: 769-779 DOI: 10.1111/mice.12049 Published: NOV 2013
Times Cited: 0 (from Web of Science)
[Full Text](#) [View abstract](#)
- Title: **Optimization of Earthquake Energy Dissipation System by Genetic Algorithm**
Author(s): Hejazi, F.; Toloue, I.; Jaafar, M. S.; et al.
Source: **COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING** Volume: 28 Issue: 10 Pages: 796-810 DOI: 10.1111/mice.12047 Published: NOV 2013
Times Cited: 0 (from Web of Science)
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- Title: **Resource Leveling in Line-of-Balance Scheduling**
Author(s): Damci, Atilla; Arditi, David; Polat, Gul
Source: **COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING** Volume: 28 Issue: 9 Pages: 679-692 DOI: 10.1111/mice.12038 Published: OCT 2013
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- Title: **A Generalized Integrated Corridor Diversion Control Model for Freeway Incident Management**
Author(s): Liu, Yue; Li, Peng; Wehner, Kevin; et al.
Source: **COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING** Volume: 28 Issue: 8 Pages: 604-620 DOI: 10.1111/mice.12024 Published: SEP 2013
Times Cited: 0 (from Web of Science)
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- Title: **Wavelet PSO-Based LQR Algorithm for Optimal Structural Control Using Active Tuned Mass Dampers**
Author(s): Amini, Fereidoun; Hazaveh, N. Khanmohammadi; Rad, A. Abdolahi
Source: **COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING** Volume: 28 Issue: 7 Pages: 542-557 DOI: 10.1111/mice.12017 Published: AUG 2013
Times Cited: 1 (from Web of Science)
[Full Text](#) [View abstract](#)
- Title: **Fuzzy-Entropy Neural Network Freeway Incident Duration Modeling with Single and Competing Uncertainties**
Author(s): Vlahogianni, Eleni I.; Karlaftis, Matthew G.
Source: **COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING** Volume: 28 Issue: 6 Pages: 420-433 DOI: 10.1111/mice.12010 Published: JUL 2013
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- Title: **Integrated Planning of Supply Chain Networks and Multimodal Transportation Infrastructure Expansion: Model Development and Application to the Biofuel Industry**
Author(s): Hajjibabai, Leila; Ouyang, Yanfeng
Source: **COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING** Volume: 28 Issue: 4 Pages: 247-259 DOI: 10.1111/j.1467-8667.2012.00791.x Published: APR 2013

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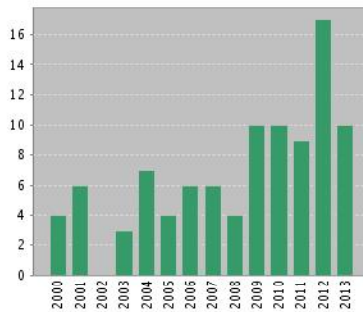
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Citation Report Publication Name=(Computer-Aided Civil and Infrastructure Engineering) AND Topic=(Genetic Algorithms)
Timespan=All years. Databases=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH.

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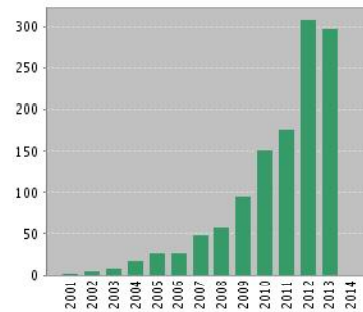


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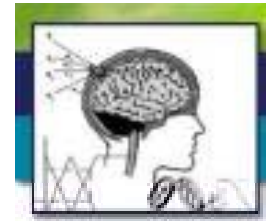
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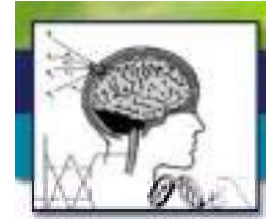
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1. Title: Bilevel parallel genetic algorithms for optimization of large steel structures Author(s): Sarma, KC; Adeli, H Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 16 Issue: 5 Pages: 295-304 DOI: 10.1111/0885-9507.00234 Published: SEP 2001	13	13	11	9	0	62	4.77
2. Title: Bridge management system and maintenance optimization for existing bridges Author(s): Miyamoto, A; Kawamura, K; Nakamura, H Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 15 Issue: 1 Pages: 45-55 DOI: 10.1111/0885-9507.00170 Published: JAN 2000	7	5	4	4	0	54	3.86
3. Title: Robust transportation network design under demand uncertainty Author(s): Ukkusuri, Satish V.; Mathew, Tom V.; Waller, S. Travis Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 22 Issue: 1 Pages: 6-18 DOI: 10.1111/j.1467-8667.2006.00465.x Published: JAN 2007	5	8	9	9	0	48	6.86

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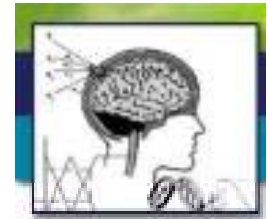
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<input type="checkbox"/>	1. Title: Bilevel parallel genetic algorithms for optimization of large steel structures Author(s): Sarma, KC; Adeli, H Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 16 Issue: 5 Pages: 295-304 DOI: 10.1111/0885-9507.00234 Published: SEP 2001	13	13	11	9	0	62
<input type="checkbox"/>	2. Title: Bridge management system and maintenance optimization for existing bridges Author(s): Miyamoto, A; Kawamura, K; Nakamura, H Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 15 Issue: 1 Pages: 45-55 DOI: 10.1111/0885-9507.00170 Published: JAN 2000	7	5	4	4	0	54
<input type="checkbox"/>	3. Title: Robust transportation network design under demand uncertainty Author(s): Ukkusuri, Satish V.; Mathew, Tom V.; Waller, S. Travis Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 22 Issue: 1 Pages: 6-18 DOI: 10.1111/j.1467-8667.2006.00465.x Published: JAN 2007	5	8	9	9	0	48
<input type="checkbox"/>	4. Title: A parallel ant colony algorithm for bus network optimization Author(s): Yang, Zhongzhen; Yu, Bin; Cheng, Chuntian Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 22 Issue: 1 Pages: 44-55 DOI: 10.1111/j.1467-8667.2006.00469.x Published: JAN 2007	10	12	7	4	0	44
<input type="checkbox"/>	5. Title: Preliminary highway design with genetic algorithms and geographic information systems Author(s): Jong, JC; Jha, MK; Schonfeld, P Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 15 Issue: 4 Pages: 261-271 DOI: 10.1111/0885-9507.00190 Published: JUL 2000	2	2	2	2	0	37
<input type="checkbox"/>	6. Title: Prescreening and Repairing in a Genetic Algorithm for Highway Alignment Optimization Author(s): Kang, Min Wook; Schonfeld, Paul; Yang, Ning Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 24 Issue: 2 Pages: 109-119 DOI: 10.1111/j.1467-8667.2008.00574.x Published: 2009	11	7	11	4	0	34
<input type="checkbox"/>	7. Title: A genetic algorithm approach for optimizing traffic control signals considering routing Author(s): Teklu, Fitsum; Sumalee, Agachai; Watling, David Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 22 Issue: 1 Pages: 31-43 DOI: 10.1111/j.1467-8667.2006.00468.x Published: JAN 2007	11	6	8	5	0	34
<input type="checkbox"/>	8. Title: Optimal design of water distribution systems using genetic algorithms Author(s): Vairavamoorthy, K; Ali, M Conference: 1st International Conference on New Information Technologies for Decision Making in Civil Engineering Location: MONTREAL, CANADA Date: OCT 11-13, 1998 Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 15 Issue: 5 Pages: 374-382 DOI: 10.1111/0885-9507.00201 Published: SEP 2000	6	2	4	2	0	32
<input type="checkbox"/>	9. Title: Modified Genetic Algorithm for the Dynamic Identification of Structural Systems Using Incomplete Measurements Author(s): Marano, Giuseppe Carlo; Quaranta, Giuseppe; Monti, Giorgio Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 26 Issue: 2 Pages: 92-110 DOI: 10.1111/j.1467-8667.2010.00659.x Published: FEB 2011	0	0	14	17	0	31
<input type="checkbox"/>	10. Title: Reliability-based optimal design of electrical transmission towers using multi-objective genetic algorithms Author(s): Mathakari, Sachin; Gardoni, Paolo; Agarwal, Pranab; et al. Conference: Conference on Computer Aided Civil and Infrastructure Engineering Location: Texas A&M, Coll St, TX Date: FEB 21-22, 2003	10	4	10	4	0	28

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11.	Title: Multiobjective optimization of concrete frames by simulated annealing Author(s): Paya, Ignacio; Yepes, Victor; Gonzalez-Vidosa, Fernando; et al. Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 23 Issue: 8 Pages: 596-610 DOI: 10.1111/j.1467-8667.2008.00561.x Published: NOV 2008	6	5	10	6	0	29	4.83
12.	Title: Wavelet-Based Denoising for Traffic Volume Time Series Forecasting with Self-Organizing Neural Networks Author(s): Boto-Giralda, Daniel; Diaz-Pernas, Francisco J.; Gonzalez-Ortega, David; et al. Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 25 Issue: 7 Pages: 530-545 DOI: 10.1111/j.1467-8667.2010.00668.x Published: OCT 2010	1	7	12	8	0	28	7.00
13.	Title: A Computerized Feature Selection Method Using Genetic Algorithms to Forecast Freeway Accident Duration Times Author(s): Lee, Ying; Wei, Chien-Hung Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 25 Issue: 2 Pages: 132-148 DOI: 10.1111/j.1467-8667.2009.00626.x Published: FEB 2010	0	6	15	6	0	27	6.75
14.	Title: Optimal Long-Term Infrastructure Maintenance Planning Accounting for Traffic Dynamics Author(s): Ng, ManWo; Lin, Dung Ying; Waller, S. Travis Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 24 Issue: 7 Pages: 459-469 DOI: 10.1111/j.1467-8667.2009.00606.x Published: 2009	6	8	7	6	0	27	5.40
15.	Title: Integrating Messy Genetic Algorithms and Simulation to Optimize Resource Utilization Author(s): Cheng, Tao-ming; Yan, Rong-zheng Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 24 Issue: 6 Pages: 401-415 DOI: 10.1111/j.1467-8667.2009.00588.x Published: 2009	9	6	8	2	0	26	5.20
16.	Title: Genetic algorithms for optimal urban transit network design Author(s): Chakroborty, P Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 18 Issue: 3 Pages: 184-200 DOI: 10.1111/1467-8667.00309 Published: MAY 2003	4	3	5	3	0	25	2.27
17.	Title: Fuzzy control of base-isolation system using multi-objective genetic algorithm Author(s): Kim, HS; Roschke, PN Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 21 Issue: 6 Pages: 436-449 DOI: 10.1111/j.1467-8667.2006.00448.x Published: AUG 2006	7	2	0	1	0	24	3.00
18.	Title: Developing Crew Allocation System for the Precast Industry Using Genetic Algorithms Author(s): Al-Bazi, Ammar; Dawood, Nashwan Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 25 Issue: 8 Pages: 581-595 DOI: 10.1111/j.1467-8667.2010.00666.x Published: NOV 2010	0	6	11	6	0	23	5.75
19.	Title: Multimode project scheduling based on particle swarm optimization Author(s): Zhang, H; Tam, CM; Li, H Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 21 Issue: 2 Pages: 93-103 DOI: 10.1111/j.1467-8667.2005.00420.x Published: FEB 2006	3	6	3	4	0	23	2.88
20.	Title: Finite Element Model Updating Using Evolutionary Strategy for Damage Detection Author(s): Jafarkhani, Reza; Masri, Sami F. Source: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING Volume: 26 Issue: 3 Pages: 207-224 DOI: 10.1111/j.1467-8667.2010.00687.x Published: APR 2011	0	0	10	12	0	22	7.33

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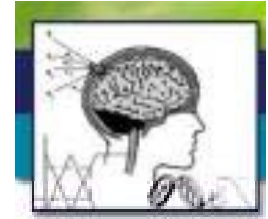
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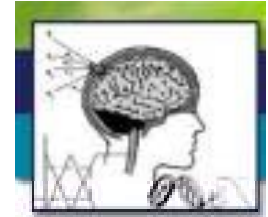
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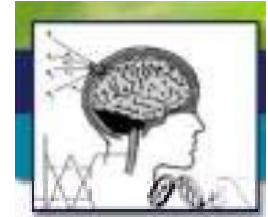
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<input type="checkbox"/>	5	TRANSPORT RES B-METH	0191-2615	4064	2.944	3.520	0.347	101	9.4	0.00953	1.487
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<input type="checkbox"/>	8	BUILD ENVIRON	0360-1323	7021	2.430	2.699	0.660	312	5.4	0.01907	0.736
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<input type="checkbox"/>	16	STRUCT SAF	0167-4730	1338	1.840	2.382	0.241	29	9.8	0.00417	1.250
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<input type="checkbox"/>	19	J WATER RES PL-ASCE	0733-9496	2185	1.709	1.757	0.101	69	9.6	0.00268	0.510
<input type="checkbox"/>	20	TRANSPORTATION	0049-4488	1358	1.657	2.131	0.344	64	8.6	0.00328	0.850

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Journal: COMPUTER-AIDED CIVIL AND INFRASTRUCTURE ENGINEERING

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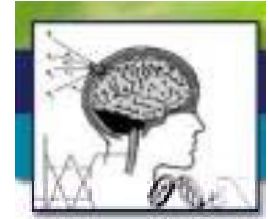
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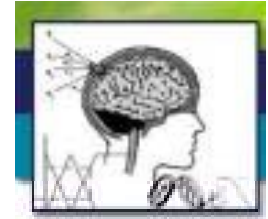
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<input type="checkbox"/>	11	COAST ENG	0378-3839	3234	2.239	2.553	0.683	101	7.9	0.00714	0.923
<input type="checkbox"/>	12	J CIV ENG MANAG	1392-3730	511	2.016		0.216	88	2.9	0.00121	
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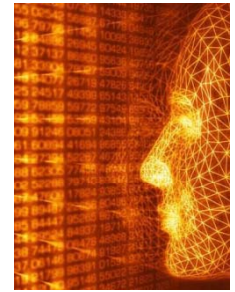
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