



Journal of Computer Science

Ministério da Educação

Ministro: Aloizio Mercadante

Reitor: Antônio Nazareno Guimarães Mendes

Vice-Reitor: José Roberto Soares Scolforo

Pró-Reitora de Pesquisa: Luis David Solis Murgas

Ed. UFLA - Presidente do conselho editorial: Renato Paiva

Volume 11, no. 1, March of 2012.

Editorial Board

Editor-in-Chief: Sanderson L. Gonzaga de Oliveira, UFLA, Brazil

Associate Editor: Leonardo Andrade Ribeiro, UFLA, Brazil

Executive Editors: Denilson Alves Pereira, UFLA, Brazil; Joaquim Quinteiro Uchôa, UFLA, Brazil

Advisory Editors: Antônio José da Silva Neto, IPRJ-UERJ, Brazil; Horácio Hideki Yanasse, INPE, Brazil; João Manuel R. S. Tavares, FEUP, Universidade do Porto, Portugal; Luiz Henrique Andrade Correia, UFLA, Brazil; Muthu Ramachandran, Leeds Metropolitan University, UK; Plínio de Sá Leitão Júnior, UFG, Brazil.

Scientific Editors

- Alceu Britto Jr., PUC-PR, Brazil
Alice Kozakevicius, UFSM, Brazil
Anderson de Rezende Rocha, UNICAMP, Brazil
André Vital Saúde, UFLA, Brazil
Annabell Tamariz, UENF, Brazil
Antonio Pedro Timoszczuk, USP, Brazil
Arnaldo de Albuquerque Araújo, UFMG, Brazil
Carlos Passos, CTI/MCT, Brazil
Danton Diego Ferreira, UFLA, Brazil
Eder Mateus Nunes Gonçalves, FURG, Brazil
Fábio Levy Siqueira, PECE Poli-USP, Brazil
Fatima L. S. Nunes, USP, Brazil
Heitor Augustus Xavier Costa, UFLA, Brazil
Ilda Reis, FEUP, Universidade do Porto, Portugal
Ilija Basicovic, University of Novi Sad, Serbia
João Manuel R. S. Tavares, FEUP, Univ. do Porto, Portugal
Jorge Martinez-Gil, University of Malaga, Spain
José Luís Braga, UFV, Brazil
Luciana A. F. Martimiano, UEM, Brazil
Luiz Carlos Begosso, FEMA, Brazil
Luiz Henrique Andrade Correia, UFLA, Brazil
Marco Aurelio Gerosa, USP, Brazil
Marcos A. Cavenaghi, UNESP, Brazil
Marinalva Dias Soares, INPE, Brazil
Michel S. Soares, UFU, Brazil
Muthu Ramachandran, Leeds Metropolitan University, UK
Neumar Malheiros, UFLA, Brazil
Omar Andres Carmona Cortes, CEFET/MA, Brazil
Paulo Eduardo Ambrósio, UDESC, Brazil
Paulo Lopes de Souza, ICMC-USP, Brazil
Rajkumar Samanta, Megnad Saha Inst. of Tech., India
Renato de Freitas Bulcão Neto, UFG, Brazil
Ricardo Terra, UFMG, Brazil
Roberto Affonso Costa Júnior, UNIFEI, Brazil
Sanderson Lincoln Gonzaga de Oliveira, UFLA, Brazil
Valter F. Avelino, USP, Brazil
Victor H. C. Albuquerque, FEUP, Univ. do Porto, Portugal
Vitus S. W. Lam, Hong Kong University, China
- Technical staff:** Ariana da Silva Laureado.
- Alexandre Francisco, UFF, Brazil
Alvaro Coêlho, UESC, Brazil
André Luiz Zambalde, UFLA, Brazil
Anita Fernandes, UNIVALI, Brazil
Antônio Maria Pereira de Resende, UFLA, Brazil
Apkar Salatian, American University of Nigeria
Bruno de Oliveira Schneider, UFLA, Brazil
Claudio Cesar de Sá, UDESC, Brazil
Denilson Alves Pereira, UFLA, Brazil
Elisa Huzita, UEM, Brazil
Fábio Silveira, UNIFESP, Brazil
Frank José Affonso, UNESP, Brazil
Hyggo Almeida, UFCG, Brazil
Ildeberto Aparecido Rodello, USP, Brazil
Isabel Cafezeiro, UFF, Brazil
Johan M. Sharif, Swansea University, UK
Jorge Rady Almeida Junior, USP, Brazil
Leonardo Andrade Ribeiro, UFLA, Brazil
Luiz Camolesi Jr., UNICAMP, Brazil
Luiz Eduardo G. Martins, UNIMEP, Brazil
Manuj Darbari, BBDNITM, India
Marco Tulio Valente, UFMG, Brazil
Maria Istela Cagnin, UFMS, Brazil
Mauricio Kischinhevsky, UFF, Brazil
Milton Heinen, UDESC, Brazil
Nahra Bencherait, University of Guelma, Algeria
Ning Chen, Instituto Superior de Engenharia do Porto, Portugal
O. P. Gupta, Punjab Agricultural University, India
Paulo Henrique de Souza Bermejo, UFLA, Brazil
Plínio Sá Leitão Júnior, UFG, Brazil
Reghunadhan Rajesh, Bharathiar University, India
Renato Ishii, UFMS, Brazil
Ricardo da Silva Torres, UNICAMP, Brazil
Rodrigo Fernandes de Mello, ICMC-USP, Brazil
Udo Fritzke Jr., PUC Minas em Poços de Caldas, Brazil
Valter Vieira de Camargo, UFSCar, Brazil
Vimal Mishra, Uttar Pradesh Technical Education, U.P., India
Wilian Soares Lacerda, UFLA, Brazil

Indexed in: **INSPEC; Qualis-CAPES.**

INFOCOMP – Journal of Computer Science – v.11, n.1 (2012) – Lavras: Universidade Federal de Lavras, 2012.
Anual (1999 - 2003), Semestral (2004), Trimestral (2005 - 2011), Quadrimestral (2012 -)
Sumários em Inglês
ISSN 1807-4545
1. Ciência da Computação I. Universidade Federal de Lavras. II. Departamento de Ciência da Computação.

Solicita-se permuta / Exchange desired; tiragem / circulation: 250.