**XXX EURO mini Conference
"Optimization in the Natural Sciences"**

February 5–9, 2014

Aveiro, Portugal

PROGRAM

Saturday, 15:00 - 16:00

■ SE-03

Saturday, 15:00 - 16:00
Room 11.1.12

Data mining

Stream: Statistics, Bioinformatics and Health Sciences
Contributed session
Chair: *Lisete Sousa*, Department of Statistics and Operations Research, Faculty of Sciences of Lisbon, University of Lisbon & CEAUL, 1749-016, Lisbon, Portugal, lmsousa@fc.ul.pt

1 - Virtual surgery of the carotid artery based on ultrasound imaging

José P. R. Gonçalves, MEB, Universidade do Porto, FEUP, Rua Doutor Roberto Frias, 4200-465, Porto, Portugal, meb12014@fe.up.pt, *Catarina F. Castro, Carlos C. António, Luisa C. Sousa*

Extra-cranial carotid Doppler ultrasound evaluation allows velocity sampling at different depths and positions that combined with B-mode ultrasound imaging leads to the identification of patients considered for surgery. A patient-specific carotid bifurcation reconstructed from ultrasound data is addressed here. The hemodynamic behavior before and after virtual removal of the stenotic plaque is simulated using an artificial neural network of configuration optimized via genetic algorithms. The performed research contributes towards the advancement of medical imaging and processing technologies.

2 - Optimal carotid bifurcation reconstruction based on ultrasound image and hybrid neural network

Catarina F. Castro, Departamento de Engenharia Mecânica, Faculdade de Engenharia da Universidade do Porto, Rua Dr. Roberto Frias, Campus da FEUP, 4200-465, Porto, Portugal, ccastro@fe.up.pt, *Carlos C. António, Luisa C. Sousa, José P. R. Gonçalves*

Carotid Doppler ultrasound scan is usually performed to assess the risk of stroke. A significant effort is being made in the study of accurate and reproducible techniques and indicators to monitor risk. The analysis of duplex ultrasound image data enables the optimization of feature reconstruction for normal and pathological bifurcations. The optimization methodology presented in this research considers the development of an artificial neural network optimized via genetic algorithms and contributes towards improvements on the widely performed diagnostic method based on freehand 2-D ultrasound.

3 - Generalized Additive Neural Networks for mortality prediction: Model selection comparison

Carlos Bras-Geraldes, Bioestatistica e Informática, Faculdade de Ciências Médicas, Campo Martires da Patria nº 130, 1169-056 , Lisbon, Portugal, cgeraldes@gmail.com, *Ana Papoila, Patricia Xufre, Lisete Sousa*

A Generalized Additive Neural Network (GANN) can be implemented by automatic methods instead of using a visual inspection of the partial residuals plots (thereby reducing human intervention in the selection process model). Among the automated methods, AutoGANN stands out as being the first to be proposed for the search for a good GANN model. However, it can be slow, particularly for a wider search

space. Thus, meta-heuristic methods such as Genetic Algorithm and Discrete Particle Swarm Optimization are introduced in this study and applied to an intensive care unit dataset.