PROCEEDINGS
OF THE
2-ND EUROPEAN SYMPOSIUM
IN
BIOMEDICAL ENGINEERING
AND
MEDICAL PHYSICS

6-8 OCTOBER
2000
PATRAS, GREECE

Organized by the Dept. of Medical Physics,
School of Medicine,
University of Patras,
Patras, Greece

Biomedical Engineering - Session A 15:30-17:30 Chairmen: K. Penkala, D. Geiger

- Theoretical and experimental study of non-linear pumping effects of a Balloon Pump, based on the concept of valveless pumping, *C. G. Manopoulos, D. Mathioulakis and S. Tsangaris*
- Development and modelling of osseointegrative Trans-Femoral, *W. XU and S. Hughes*
- Device for the objective assessment of the mechanical properties of tissues, *M. Sunaric, G. Anastassopoulos, I. Lytras, S.D. Pantelou, D. G. Hatzichristou, V. Tzortzis and M. Melachrinou*
- Second harmonic generation during thermal denaturation of collagen, *G.S. Papti, T. Theodossiou, E. Georgiou and D. Yova*
- A miniaturised near infra-red module for cortical oxygenation mapping, *P. Rolfe, D. Rajetto, F. Bottini, C.Ruggiera and G. Mondo*
- A low cost PC based laboratory system for high-quality multi-channel recording and analysis of bioelectric events, *E. Valchinov and N. Pallikarakis*
- Examination of recovery times in electric current perception, *M. Majerowicz*
- Data acquisition system for a pulse dupiicator, *D. Cosma, R. Cupa, R. Hose and K. McCormack*
- Determinants of maximal and total left ventricular power: A mathematical model study, *P. Segers, S. Carlier, N. Westerhof and P. Verdonck*
- Dimensionless flow and mass transfer analysis in artificial lungs, *P. Dierickx, D. De Wachter, F. De Somer, G.D. Cock, T. Serroels, G. Van Nooten and P. Verdonck*
- CFD and SPECT visualisation of FLOW through a dialyzer, *S. Eloot, P. Dierickx, L. Bauwens, B. Quvelier, R. Dierckx and P. Verdonck*
- Rapid reconstruction and 3-D display of vasculature from biplanar X-ray angiograms, *C. Valsamopoulos, D. Cavouras, Dimitropoulos and S. Theodoridis*
- Mammographic mass shape characterization using Neural Networks, *H. Georgiou, D. Cavouras, Dimitropoulos and S. Theodoridis*
- Wavelet Neural Networks-Classification and Prediction, *P. Cristea, R. Tuduce and A. Cristea*
- Neural Networks based data mining tool for medical databases, *L. Vladutu, R. Vladutu, S. Papadimitriou and A. Bezerianos*
- Auditory feedback stimulation for people with Parkinson's disease, *A. Prentza, I. Vlachos, A. Anagnostaki and D. Koutsouris*
- Developing a pattern recognition system for the analysis of pre-linguistic infant vocal expressions, *C. Papaeliou, G. Minadakis and D. Cavouras*
- An insight in the electrocardiographic signal by means of wavelet analysis, *D.E. Creanga, D. Ursu, M. Gheorghiu and C. Radu*
- Security architecture in regional health care information networks, *A. Bourka, D. Polemi, D. Koutsouris*

Fri 6 Sat 7 Sun 8

MAMMOGRAPHIC MASS SHAPE CHARACTERIZATION USING NEURAL NETWORKS

H. Georgiou[1], D. Cavouras[2], N. Dimitropoulos[3], S. Theodoridis[1].

1.Informatics Dept., University of Athens, TYPA buildings, Univ. Campus, 157 71, Athens. mailto: ChristopheSoft@netscape.net, or, stheodor@di.uoa.gr
2.Medical Instrument Technologies Dept., Athens TEI, 12210, Athens. mailto:cavouras@hol.gr, or, cavouras@ee.teiath.gr
3.Medical Imaging Dept., EUROMEDICA Medical Center, 2 Mesogeion ave, Athens.

Abstract

Scope: The automated classification of mammographic masses according to the contour shape in one of five predefined categories, which can be indicative to the degree of benignancy or malignancy of the mass.

Method: The contour shape of the mass retrieved from mamographic images was used to classify the mass as nodular (round, oval, lobulated, microlobulated) or stellate type. The mammographic mass borderline was constructed using histogram thresholding techniques. The classification of shapes in one of the five categories was performed by using Pattern Recognition techniques and with the use of Neural Network (NN). Eleven attributes of the borderline were used as input, calculated as the radial distance from the mass center, while the five classification categories were used as output. The internal network topology included 1 hidden neuron layer with 8 neurons. A set of patterns was used for the training phase and another one for the evaluation phase of the system.

Results: The precision of correct classification of the masses in one of the five predefined morphologic categories was nearly 90%. The largest classification error percentage (5%) was noted between masses with round and microlobulated shape.