



COST ACTION B21

Physiological Modelling of MR Image Formation

8th MANAGEMENT COMMITTEE AND WG1, WG2, WG3 MEETINGS

LOCAL

**Professor Stanislav Kovacic
University of Ljubljana
Slovenia**

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VENUE

**Kompas Hotel
Cankarjeva Cesta 2,
4260 Bled
Slovenia
Telephone + 386 4 578 21 00**

29th – 31st March, 2007

AGENDA



The meeting will be in two parts. On Thursday 29th March a small meeting will be held of Working Group 3, intended for those that have participated in the 2D/3D Texture Analysis trial from the Rennes Data. On Friday 30th March the normal COST B21 meeting will commence with WG1 and WG2 sessions, and a report on the conclusions of the WG3 session held the previous day. On Saturday 31st March the Management Committee will be held.

Thursday 29th March

09.10 Welcome
S Kovacic (SI)

09.25 Introduction
R Lerski (UK)

Working Group 3 – Multicentric evaluation of 2D and 3D Texture Analysis on Liver and Brain Databases: Chairman – J de Certaines (FR)

09.40 Introduction
J de Certaines (FR)

09.45 Goals of the Working group on methods and evaluation
J de Certaines (FR)

10.00 Image databases and data collected
L Tran (FR)

10.30 *Coffee*

11.00 **Results Analysis on Liver Database: Chairperson – M Dezortova (CZ)**
Presentations of the results from the different units by the participants.

Comparative analysis of the results on liver database:

- Liver volume by segmentation
- Fibrosis grading by 2D or 2D texture analysis

12.30 *Lunch*

13.30 Investigating the performance of grey level co-occurrence matrix in characterizing brain MR Images
Dr D Mahmoud-Gonheim (UAE)

14.00 **Results Analysis on Glioblastomas Database: Chairperson – R Lerski (UK)**

Presentations of the TA results from the different units by the participants

Comparative analysis of the results on glioblastomas database:

- Tumour limits
- Intratumoural heterogeneity
- Extratumoural “abnormal” areas
- Contralateral vs tumoural side differentiation
- 2D vs 3D TA

15.45 **Coffee**

16.00 **Discussion of a draft for publication(s): Chairpersons – J de Certaines (FR) and R Lerski (UK)**

- Liver
- Glioblastomas

17.30 Close

Friday 30th March

08.45 Welcome
S Kovacic (SI)

08.50 Introduction
R Lerski (UK)

Working Group 1 – Tissue parameters and physiological data, including MRI : Chairman – J Reichenbach (DE)

09.00 Introduction
J Reichenbach (DE)

09.05 MRI Visualization of pancreatic islets transplantation
M Hajek (CZ)

09.30 Lung Imaging using Proton MRI
L Schad (DE)

09.55 Multiparametric assessment of kidney structure and function
A Lundervold (NO)

10.20 Magnetic Resonance Imaging of the Brain in rat model of amyotrophic lateral sclerosis
G Bacic (CS), P Andjus (CS)

10.45 **Discussion**

11.00 *Coffee*

Working Group 2 – Software, simulation and modelling : Chairman – A Materka (PL)

11.20 Introduction
A Materka (PL)

11.25 Medical Image Registration
F Pernus (SI)

11.50 Report on software
P Szczypinski (PL), M Strzelecki (PL)

12.10 Vessel tracking/quantitative analysis of digital and physical phantom data
M Kocinski (PL), A Materka (PL)

12.30 Segmentation of pancreatic islets in 3D MRI mouse liver data
M Strzelecki (PL), D Jirak (CZ)

12.50 *Discussion*

13.00 *Lunch*

14.15 **Report on WG3 meeting held Thursday 29th March**
Discussion

15.15 *Coffee*

Plenary Meeting – Plans for the Action in 2006

16.00 Working Group 1 - J Reichenbach
Working Group 2 - A Materka
Working Group 3 - J Chambron (J de Certaines)
Overall B21 Action - R A Lerski

18.00 *Close*

COST Action B21
Physiological Modelling of MR Image Formation

8th Management Committee Meeting

VENUE
Kompas Hotel
Bled, Slovenia

Saturday 31st March, 2007

A G E N D A
9.00 – 18.00



Chairman – Dr R A Lerski

- 1) Welcome to participants
- 2) Adoption of the Agenda
- 3) Adoption of the Minutes of the last meeting held in Brussels (20 October, 2006)
- 4) Presentation of the delegations
- 5) Status of COST B21 Action
- 6) Report from the Chair and the Science Officer: Budget Status
- 7) Non-COST participation.
- 8) Short Term Scientific Missions
- 9) Dissemination : publications and web site
- 10) Update on Work Plan
 - ◆ Objectives and work programme
 - ◆ Working methods, organisation and management
 - ◆ Distribution of tasks
 - ◆ Annual Plan
- 11) Agreement of next Working Group meetings
- 12) Place and date of next meeting of the Management Committee
- 13) Any Other Competent Business

10.00 – 10.30 : *Coffee*
13.00 – 14.00 : *Lunch*

Participants to be reimbursed by COST

Working Group 1:

M Bittsansky (SK) *
M Pascu (RO)*
J Chambron (FR)
R Dommissie (BE)
G Gregoriou (CY)
T Jandanhazy (HU)
S Kovacic (SI) - Local – No reimbursement
J Reichenbach (DE)
P Rogelj (SI)* - Local – No reimbursement
M Strzelecki (PL)
L Schad (DE)
M Kocinski (PL)*

Working Group 2:

F Pernus (SI)*
H Benoit-Cattin (FR)*
P Szczypinski (PL) *
A Jarc (SI) * - Local – No reimbursement
N Culeddu (IT)
A Spisni (IT)
A Santos (ES)
E Moser (AT)

Working Group 3:

R Lerski (UK)
M Hajek (CZ)
J de Certaines (FR) *
A Materka (PL)
M Dezortova (CZ)
D Dobrota (SK)
J Urdzik (SK)*
A Lundervold (NO)
F-L Tran (FR)*
N Apostolou (UK)*
G Bacic (CS)
D Mahmoud-Gonheim (UAE)* - Invited speaker
* Working Group only members

Summary about reimbursed participants:

Management Committee members	=	19
Non-Management Committee Working Group participants*	=	13
TOTAL	=	32
Local or no reimbursement	=	3

CV And Abstract of Invited Speaker

Investigating the Performance of Grey Level Cooccurrence Matrix in Characterizing Brain MR Images

Doaa Mahmoud Ghoneim*, Mariam Alkaabi, Frank Gottsche
Physics Department, U.A.E. University, Al-Ain, P.O. Box: 17551, U.A.E.
(In collaboration with Rennes I University, France)

Abstract

The Cooccurrence Matrix (COM), also known as Haralick Matrix, has shown high performance as a Texture Analysis method on MR images. The parameters extracted from COM were able to highlight features discriminating between pathological and non-pathological tissues in muscles, white matter, liver and bone. Some attempts have been carried out to enhance the COM performance hoping to achieve almost zero classification errors. One of those attempts was to extend the matrix calculation on 3D MRI dataset instead of single 2D slice. This has shown to enhance classification by increasing the joint grey levels probabilities corresponding to discriminant features, and reducing those due to noise or fluctuations. In the current work a comparative study on classification results of COM has been carried out using three calculation approaches: i) Classical matrix on single 2D slice, ii) Averaging matrix on multiple 2D slices; and iii) Extended matrix calculated on a 3D volume. These approaches are applied using 3 different normalization factors (number of bits per pixels): 32, 64, and 127; respectively. The relationship between the normalization factor and accuracy of classification is investigated. Four MRI brain regions of glioblastoma patients are tested using the above approaches, those are: i) Tumor, ii) Peritumoral WM (suspected), iii) Homolateral WM (normal), and, iv) Contralateral WM (normal). Cooccurrence Histograms COH are also tested on brain MRI and compared for the above regions.

* Dr. Mahmoud is an Assistant Professor in the Physics Department at United Arab Emirates University. She has carried out her PhD thesis, and a part of her postdoctoral research, in the field of MRI Texture Analysis under the supervision of Dr. Jacques de Certaines, Rennes I University, France. Currently, Dr. Mahmoud is collaborating with Rennes I University, as a partner of the COST B21: Physiological Modeling of MR Image Formation, on 3D Texture Analysis of glioblastoma and white matter characterization on MRI brain datasets.

CV of invited speaker

Doaa MAHMOUD GHONEIM

PhD Medical Physics
Assistant Professor
Physics Department
United Arab Emirates University

Date of birth: 21st August 1973
Nationality: Egyptian.
Address: PO BOX 14231 AL AIN, United Arab Emirates
Mobile: (+) 971 50 3347986
Home : (+) 971 3 7544694
Email address: dmahmoud@uaeu.ac.ae

ACADEMIC EDUCATION AND CERTIFICATES

- 2003: Ph.D. in Medical Physics. Thesis entitled: "Developing Methods of Texture Analysis in Magnetic Resonance Imaging: Application on Muscular and Adipose Tissues". Faculty of Medicine, Rennes University, France, (Scholarship sponsored by the French Government 200-2003).
- 1999: M.Sc. "Signal and Image Processing in Biology and Medicine". Faculty of Medicine Rennes University, France.
- 1996: Postgraduate diploma in "Medical Biophysics". Faculty of Sciences, Cairo University, Egypt.
- 1996: Postgraduate diploma in "Software Skills Development Program". Information Technology Institute, Egypt.
- 1995: B.Sc. Biophysics. Faculty of Sciences, Cairo University, Egypt. Evaluation : « Distinction with Honor »

PROFESSIONAL EXPERIENCE

ACADEMIC POSITIONS

- **February 2004 – to date:**

Job title: Assistant Professor.

Employer: Physics department, College of Science, UAE University, UAE.

Job description:

- Lecturing advanced courses in Medical Physics for undergraduate students (see list of courses taught).
- Lecturing basic Physics course for undergraduate students (see list of courses taught).
- Scientific research: international publications in "peer review" journals and attending conferences in the field of MRI texture analysis.
- Organizing conferences and workshops on national and international levels in UAE.
- Participating in the development process of the college by being member of several committees on the department and college level.
- Promoting the extracurricular activities.
- Enhancing the public knowledge of physics through giving general lectures outside the university as a part of community services.

- **November 1995- January 1998:**

Job title: Assistant Lecturer.

Employer: Biophysics Department, Faculty of Science, Cairo University, Egypt.

Job description:

- Demonstrating Biophysics experiments for undergraduate students.
- Scientific Research in medical biophysics field.

NON-ACADEMIC POSITIONS, INTERSHIPS AND STUDENTSHIPS

- **September 1998 – September 2003:** PhD and MSc studentships funded by the French Government in "Applied Informatics" and carried out at the Laboratory of Magnetic Resonance in Biology and Medicine, Faculty of Medicine, Rennes University, France.

Job description:

- PhD preparation.

- Developing automated MR Image texture analysis methods.
 - Programming for medical image processing.
 - Initiating and maintaining collaboration between different research groups.
- **October 1996- January 1998:** Programming internship in "Information Technology Institute", Cairo, Egypt.
- Job description:**
- Software development: programming, maintenance, management and documentation.
 - Websites development and maintenance.

EXPERIENCE IN UNIVERSITY DEVELOPMENT, CURRICULAR AND EXTRACURRICULAR ACTIVITIES

- Member of Medical Physics committee; Physics Department, *UAEU*: follow-up and enhancing the Medical Physics program in the department.
- Member of the Academic Development and Outcomes committee; Physics Department (2006-2007), *UAEU*: annually assessing the percentage of students' gain in different courses offered by the department.
- Member of Students' Training committee; Physics Department (2006-2007), *UAEU*: supervising students during summer training (compulsory requirement for graduation).
- Advisor of Science Society (2005-2006), *UAEU*: supervising students in extracurricular activities which are supported on the university level by 'Youth Care and Students Activities' section.
- Member of Extracurricular activities committee, College of Science (2005-2006), *UAEU*: carrying out extracurricular activities and advising students, organizing exhibitions and fairs.
- Member of Scientific Research Committee; department level (2005-2006), *UAEU*: preparing postgraduate programs proposals, reviewing grant applications and other research related issue.
- Member of "Physics Day" Committee, Physics Department (2005-2006), *UAEU*: organizing an annual academic and social event which involves students, faculty members, guests and collaborating enterprises.

EXPERIENCE IN ORGANIZING INTERNATIONAL CONFERENCES AND WORKSHOPS

1. The international Conference in Biological and Medical Physics, Al AIN, 27-30 March 2005, UAE.
 - Member of the organizing committee.
 - Member of the scientific committee.
 - Coordinator of public relations committee.
2. The International Conference on Heliophysical Year, 17-19 November 2005, Abu Dhabi and Al AIN, UAE
 - Member of the organizing committee.

LIST OF UNDERGRADUATE COURSES TAUGHT

Advanced Physics Courses

1. **Physics of Medical Imaging and Instrumentation:** an advanced study on different recent technologies in medical imaging and their physical principles; also, image processing and analysis theories and implementation using MATLAB.
2. **Modeling of Physical Systems:** a research project carried out by the student which contains a theoretical part and a programming part using MATLAB or FORTRAN languages.
3. **Physics of Radiation Therapy:** radiation principles, radiation techniques for therapeutic uses.
4. **Biophysics:** biomechanics, bio-membranes and other physics subjects related to biology.

Basic Physics Courses

1. **General Physics II:** Electricity and Magnetism for Physics students.
2. **General Physics II for Biology Students:** Electricity and Magnetism directed toward biological applications and explaining some biological processes like nerve conduction.

INFORMATION TECHNOLOGY

Particular skills in the field of Information Technology and its applications, mainly:

- **Image Processing and Analysis:** Developing and implementing image analysis methods using IDL® and MATLAB® programming language (particularly on medical images).

- **Computer Science:** Operating Systems, Software Project Management, Structured and Object Oriented Analysis and Design, Databases, Network protocols, and programming languages such as C, C++, ..etc.

RESEARCH AND PUBLICATIONS

GRANTED FOR:

- ➔ UNITED ARAB EMIRATES RESEARCH FUND # 05-02-2-11/06 (2005/2006)
- ➔ UNITED ARAB EMIRATES RESEARCH FUND # 01-02-2-11/07 (2006/2007)

PUBLICATIONS IN “PEER REVIEWED” JOURNALS

- **"Texture analysis of Magnetic Resonance Images of rats' muscles during atrophy and regeneration". Magnetic Resonance Imaging.**
Journal: **Magnetic Resonance Imaging. Pages 167-171, Vol 24 (2006)**
Authors: **Doaa Mahmoud-Ghoneim, Yan Cherel, Laurent Lumere, Jacques de Certqines, and Armelle Maniere.**
- **"Ex-vivo Magnetic Resonance Imaging Texture Analysis can discriminate genotypic origin in bovine meat."**
Journal: **Journal of Sciences of Food and Agriculture. Pages 629-632, Vol 85 (2005)**
Authors: **Doaa Mahmoud-Ghoneim, Jean-Marie Bonny, Jean-Pierre Renou, and Jacques D. de Certaines.**
- **"Three Dimensional Texture Analysis in MRI: a preliminary evaluation in gliomas."**
Journal: Magnetic Resonance Imaging, Pages 983-987, Vol 21 (9, 2003).
Authors:Doaa Mahmoud-Ghoneim, Grégoire Toussaint, Jean-Marc Constans, and Jacques D. de Certaines.
- **"Texture Analysis and Metabolic Magnetic Resonance Imaging (A review)."**
Journal: Trends in Applied Spectroscopy. Pages 1-20 , Vol 4 (2002)
Authors: Pierre-Antoine Eliat, **Doaa MAHMOUD-GHONEIM**, Jacques D. De Certaines.
- **"Gender Difference on Magnetic Resonance Imaging Texture Analysis of Human Adipose Tissue."**
Journal: Journal of women's imaging (The official Journal of American Association of Women Radiologists). Pages 105–107, Vol 3 (2001).
Authors: **Doaa MAHMOUD-GHONEIM**, Jacques D. De Certaines, Sandra Herlidou, Yan Rolland, Armelle Manière.

PRESENTATIONS IN CONFERENCES WITH SELECTION COMMITTEE:

- **The 7th Annual Research Conference, April 2006, AL AIN, UAE. Oral Session:**
"Ex-vivo Magnetic Resonance Imaging Texture Analysis can discriminate genotypic origin in bovine meat".
Doaa MAHMOUD-GHONEIM, Jean-Marie Bonny, Jean-Pierre Renou, Jacques D. de Certaines.
- **The First Workshop in Medical Physics at UAE, 2004, Dubai, UAE. Oral session:**
"Magnetic Resonance Imaging Texture Analysis in rat muscles atrophy and regeneration."
Doaa MAHMOUD-GHONEIM, Yan Cherel, Julie Lesoeur, Laurent Lemaire, Chantal Rocher, Jacques D. De Certaines, Armelle Maniere
- **GRAMM, 2003, Angers, France. Oral session:**
MAHMOUD-GHONEIM D, TOUSSAINT G, CONSTANS JM, de CERTAINES JD.
" L'analyse de texture 3D en IRM : applications sur les tumeurs cérébrales"
- **The IIV international conference on "Fully three-dimensional reconstruction in Radiology and Nuclear Medicine", 2003, St Malo, France. Poster session:**
MAHMOUD-GHONEIM D, TOUSSAINT G, CONSTANS JM, de CERTAINES JD.
"Three Dimensional Texture Analysis in MRI: application on tumor characterization"
- **ESRMB 17th annual meeting 2000, Paris, France. Oral session:**

“Segmentation for Volume Calculation and Texture Analysis in MRI of the Lateral Pterygoid Muscle after Maxillo-Facial Surgery: a Preliminary Study”, D. MAHMOUD, A. MANIERE, S. HERLIDOU, J.D. de CERTAINES.

- **GRAMM 9th Conference 2000, Lille, Paris, France. Oral session:**
“Analyse de texture et calcul de volume du muscle ptérygoïdien latéral en IRM après chirurgie maxillo-facial : étude préliminaire”

D. MAHMOUD, A. MANIERE, S. HERLIDOU, J.D. de CERTAINES.

LANGUAGES

- Arabic : Mother language
- English : Advanced level (reading, writing, speaking).
- French : High Intermediate level (reading, writing, speaking).

HONORS

- Second position in the final classification of the Faculty of Science graduates (and first position on Biophysics Department graduates), Cairo University, Egypt 1995.
- Nominated as the “Ideal Student” of the Faculty of Science, Cairo University, Egypt in 1994 and 1995.

Copies of certificates and references are available upon request.