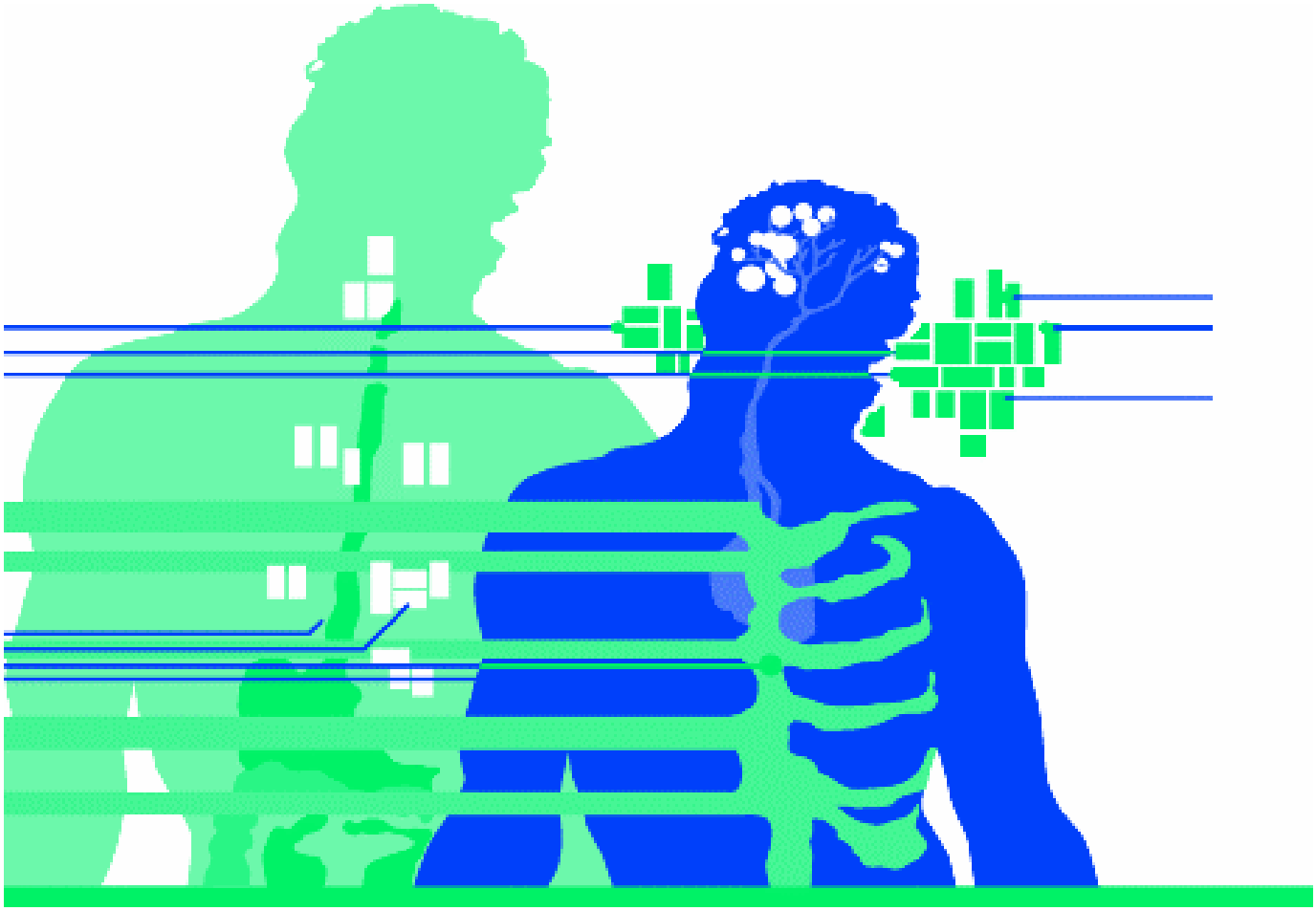
IEEE CBMS 2005

June 22-24
Trinity College Dublin, Ireland

The 18th IEEE Symposium on Computer-Based Medical Systems



Technical Programme

Sponsored by
IEEE Computer Society, Technical Committee on Computational Medicine (TCCM)
Trinity College Dublin, Department of Computer Science
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Special Events

Tutorial: Data Mining Large Medical Time Series Databases, Dr. Eamonn Keogh.
Wednesday, June 22, 14:00-17:00. Maxwell Theatre, Hamilton Building.

Reception: Wednesday, June 22, 17:00-19:00. Hamilton Building Foyer.

Coffee breaks: Wednesday, June 22, 15:20-15:40; Thursday, June 23, 11:30-11:50, 17:00-17:20;
Friday, June 24, 11:30-11:50. Hamilton Building Foyer.

Keynote talks:

1. Prof. Jan Komorowski, Supporting the Paradigm Shift in Life Sciences – The Rough Set Experience.
Thursday, June 23, 9:00-9:45. Joly Theatre.

2. Prof. Jane Grimson, Population-Based Records: Supporting Biomedical Research.
Thursday, June 23, 14:30-15:15. Joly Theatre.

3. Dr. R. Bharat Rao, Clinical Data Analysis & Patient Management from Existing Patient Records.
Friday, June 24, 9:00-9:45. Joly Theatre.

Technical sessions: Thursday, June 23, 9:50 - Friday, June 24, 16:10.
Hamilton Building; Joly, Salmon, and Synge Theatres.
All lecture theatres are equipped with overhead transparency projectors, slide projectors, computer data projectors for projecting from your own laptop and a computer (MS Windows 2000/XP) with a CD-ROM drive, USB ports, and presentation software (MS PowerPoint, Adobe Acrobat Reader), and laser pointers.
Please be in the lecture theatre at least 10 minutes before the technical session with your scheduled presentation starts.

Dinner: Thursday, June 23, 19:45-22:00. The Davenport Hotel. Merrion Square, Dublin 2 (opposite to Dunlop Oriel House, Entrance 4 on the map of Trinity College).

Technical Sessions

June 23, 2005; Thursday

Session 1A (9:50-11:30, Joly Theatre)
Medical Imaging
Chair: Sameer Antani, National Library of Medicine, USA

Medical Imaging and Osteoporosis: Fractal's Lacunarity Analysis of Trabecular Bone in MR Images
A. Zaia, R. Eleonori, P. Maponi, R. Rossi, and R. Murri; Italian National Research Centers on Aging, Italy; Univ. of Camerino, Italy

A Novel Approach to Extract Sublingual Vein from Color Image
K. Wang, Z. Yan, and H. Zhang; Harbin Institute of Technology, China; Univ. of Manchester, UK

A Graph-Theoretical Clustering Method for Detecting Clusters of Micro-calcifications in Mammographic Images
L. P. Cordella, G. Percannella, C. Sansone, and M. Vento; Università degli Studi di Napoli "Federico II", Italy; Università degli Studi di Salerno, Italy

Vessel Segmentation and Analysis in Laboratory Skin Transplant Micro-angiograms
A.-P. Condurache, T. Aach, S. Grzybowski, and H.-G. Machens; Univ. of Lübeck, Germany; Univ. Hospital of Schleswig-Holstein, Germany

An Iterative Approach for Reconstruction of Arbitrary Sparsely Sampled Magnetic Resonance Images
H. Pirsiavash, M. Soleymani, and G.-A. Hossein-Zadeh; Sharif Univ. of Technology, Iran; Univ. of Tehran, Iran

Session 1B (9:50-11:30, Salmon Theatre)
Decision Support Systems
Chair: Vili Podgorelec, University of Maribor, Slovenia

Guided Interactive Diagnostic Systems
G. Sacco; Universita' di Torino, Italy

Time Allocation Simulation Model of Clean and Dirty Pathways in Hospital Environment
M. Krizmaric, T. Zmauc, D. Micetic-Turk, G. Stiglic, and P. Kokol; Univ. of Maribor, Slovenia

Decision Support System Using Multimedia Case History Quantitative Comparison And Multivariate Statistical Analysis
N. Shklovskiy-Kordi, V. V. Shakin, G. D. Ptashko, M. Surin, B. Zingerman, S. Goldberg, and M. Krol; National Center for Hematology, Russia; MGH, USA; Mount Sinai School of Medicine, USA

iAPERAS - Intelligent Athlete's Personal Assistant
M. Verlic, M. Zorman, and M. Mertik; Univ. of Maribor, Slovenia

Towards the Framework of Adaptive User Interfaces for eHealth
E. Vasilyeva, M. Pechenizkiy, and S. Puuronen; Univ. of Jyväskylä, Finland

Session 1C (9:50-11:30, Synge Theatre)
Special Track 8: Grids for Biomedicine and Bioinformatics 1
Chair: Maria Mirto, University of Lecce, Italy

On-line Application Performance Monitoring of Blood Flow Simulation in Computational Grid Architectures
A. Tirado-Ramos, D. Groen, and P. Sloot; Univ. of Amsterdam, Netherlands

GeneGrid: Grid Based Solution for Bioinformatics Application Integration and Experiment Execution
P. V. Jithesh, N. Kelly, P. Donachy, T. J. Harmer, R. H. Perrott, M. McCurley, M. Townsley, J. Johnston, and S. McKee; Queen's Univ. of Belfast, UK

A Grid Enabled PSE for Medical Imaging Applications: Experiences on MedIGrid
V. Boccia, M. R. Guarracino, L. D'Amore, and G. Laccetti; ICAR - CNR; Univ. of Naples Federico II, Italy

Grid-Enabled Workflows for Data Intensive Medical Applications
T. Glatard, J. Montagnat, and X. Pennec; CNRS, France; INRIA, France

Grid Computing in 3D Electron Microscopy Image Processing Using Xmipp
S. H. W. Scheres, A. J. Merino, C. O. S. Sorzano, and J. M. Carzo; National Center for Biotechnology, Spain

GIMI: Generic Infrastructure for Medical Informatics
A. Simpson, D. Power, M. Slaymaker, and E. Politou; Univ. of Oxford, UK

Session 2A (11:50-13:30, Joly Theatre)
Knowledge-Based Systems and Data Mining
Chair: Haiying Wang, University of Ulster, UK

Feature Subset Selection for Improving the Performance of False Positive Reduction in Lung Nodule CAD
L. Boroczky, L. Zhao, and K. P. Lee; Philips Research, USA

Improving Mining of Medical Data by Outliers Prediction
V. Podgorelec, M. Hericko, and I. Rozman; Univ. of Maribor, Slovenia

Automated Optic Nerve Analysis for Diagnostic Support in Glaucoma
J. Yu, S. Abidi, P. Artes, A. McIntyre, and M. Heywood; Dalhousie Univ., Canada

Predicting Preterm Birth Using Artificial Neural Networks
C. Catley, M. Frize, R. Walker, and D. Petriu; Carleton Univ., Canada; Univ. of Ottawa, Canada; Children's Hospital of Eastern Ontario, Canada

Precedence Temporal Networks for Gene Expression Data
L. Sacchi, R. Bellazzi, R. Porreca, C. Larizza, and P. Magni; Univ. of Pavia, Italy

Session 2B (11:50-13:30, Salmon Theatre)
Special Track 2: Intelligent Data Analysis of Electrocardiogram Data
Chair: Chris Nugent, University of Ulster, UK

Combining Algorithms in Automatic Detection of R-peaks in ECG Signals
J. Fernandez, M. Harris, and C. Meyer; Philips GmbH, Germany

Optimisation of Neural Network Training through Pre-establishment of Synaptic Weights Applied to Body Surface Mapping Classification
M. Donnelly, C. Nugent, D. Finlay, N. Rooney, and N. Black; Univ. of Ulster, UK

A Method for the ECG Inverse Problem in the Frequency Domain
C. Navarro, C. Turner, O. Escalona, C. Owens, J. Anderson, and A. A. J. Adgey; Royal Victoria Hospital, Belfast, UK; Univ. of Ulster, UK; Universidad Simon Bolivar, Venezuela

Incremental Learning of Ensemble Classifiers on ECG Data
J. Macek; University College Dublin, Ireland

Session 2C (11:50-13:30, Synge Theatre)
Special Track 8: Grids for Biomedicine and Bioinformatics 2
Chair: Maria Mirto, University of Lecce, Italy

The Telescience Project: Application to Middleware Interaction Components
A. Lin, L. Dai, K. Ung, S. Peltier, and M. Ellisman; Univ. of California at San Diego, USA

Integration of Computational Fluid Dynamics and Computational Aero Acoustics on Grid for Dental Applications
K. Nozaki, T. Akiyama, S. Shimojo, S. Maeda, and H. Tamagawa; Cybermedia Center, Osaka University, Japan; Osaka University Dental Hospital, Japan

Preprocessing of Mass Spectrometry Proteomics Data on the Grid
M. Cannataro, P. Guzzi, T. Mazza, G. Tradigo, and P. Veltri; Univ. of Catanzaro, Italy

ProGenGrid: A Workflow Service Infrastructure for Composing and Executing Bioinformatics Grid Services
G. Aloisio, M. Cafaro, S. Fiore, and M. Mirto; Univ. of Lecce, Italy

Experiences on a Large Scale Grid Deployment with a Computationally Intensive Biomedical Application
J. M. Alonso, V. Hernández, and G. Moltó; Universidad Politécnica de Valencia, Spain

NeuroGrid: Using Grid Technology to Advance Neuroscience
J. Geddes, S. Lloyd, A. Simpson, M. Rossor, N. Fox, D. Hill, J. V. Hajnal, S. Lawrie, A. McIntosh, E. Johnstone, J. Wardlaw, D. Perry, R. Procter, P. Bath, and E. Bullmore; Univ. of Oxford, UK; Univ. College London, UK

Session 3A (15:20-17:00, Joly Theatre)
Biomedical Data Analysis 1
Chair: Marina Krol, Mount Sinai School of Medicine, USA

Validating Health Status Questionnaires in Medicine: Examples from a Real Life Trial
M. Peterson, L. Robbins, and N. Kwong; Hospital for Special Surgery, USA

An Online Analysis and Information Fusion Platform for Heterogeneous Biomedical Informatics Data
S. R. Ganta, J. Kasturi, J. Gilbertson, and R. Acharya; Pennsylvania State Univ., USA; Univ. of Pittsburgh Cancer Institute, USA

A Data Mining Based Approach for the EEG Transient Event Detection and Classification
T. Exarchos, A. Tzallas, D. Fotiadis, S. Konitsiotis, and S. Giannopoulos; Univ. of Ioannina, Greece; Univ. Hospital of Ioannina, Greece

Principal Component Analysis of Spectral Perturbation Parameters for Voice Pathology Detection
P. Gomez-Vilda, F. Diaz-Perez, A. Alvarez-Marquina, K. Murphy, C. Lazaro-Carrascosa, R. Martinez-Olalla, and V. Rodellar-Biarge; Univ. Politecnica de Madrid, Spain

Session 3B (15:20-17:00, Salmon Theatre)
Special Track 1: Medical Image Analysis: Techniques and Applications 1
Chair: Irina Ilovici, Rensselaer Polytechnic Institute, USA

A Novel Approach for Breast Skin-Line Estimation in Mammograms
Y. Sun, J. Suri, and R. Rangayyan; Fischer Imaging Corporation, USA; Univ. of Calgary, Canada

Improving Genericity and Performances of Medical Systems Based on Image Analysis
J.-B. Fasquel and V. Agnus; IRCAD, France

Analysis of the Pancreato-Biliary System from MRCP
K. Robinson and P. Whelan; Dublin City Univ., Ireland

Radio Frequency Ablation Registration, Segmentation, and Fusion Tool
E. McCreedy, R. Cheng, P. Hemler, A. Viswanathan, B. Wood, and M. McAuliffe; National Institutes of Health, USA

Wavelet-Based Texture Classification of Tissues in Computed Tomography
L. Semler, L. Dettori, and J. Furst; DePaul Univ., USA

Session 3C (15:20-17:00, Synge Theatre)
Special Track 3: Data Mining 1
Chair: Mykola Pechenizkiy, University of Jyväskylä, Finland

Mining Associations over Human Sleep Time Series
P. Laxminarayan, C. Ruiz, S. Alvarez, and M. Moonis; iProspect.com, USA; Worcester Polytechnic Institute, USA; Boston College, USA; Univ. of Massachusetts Medical School, USA

Approximations to Magic: Finding Unusual Medical Time Series
J. Lin, E. Keogh, A. Fu, and H. Van Herle; University of California at Riverside, USA; The Chinese University of Hong Kong, Hong Kong; University of California at Los Angeles, USA

Classifying Craniosynostosis Deformations by Skull Shape Imaging
S. Ruiz-Correa, R. W. Sze, J. H.-T. Lin, L. G. Shapiro, M. L. Speltz, and M. L. Cunningham; Children's Hospital and Regional Medical Center, USA; Univ. of Washington, USA

A Practical Tool for Visualizing and Data Mining Medical Time Series
L. Wei, N. Kumar, V. N. Lolla, E. Keogh, S. Lonardi, C. Ratanamahatana, and H. Van Herle; University of California at Riverside, USA

A Missing Data Estimation Analysis in Type II Diabetes Databases
M. Giardina, Y. Huo, F. Azuaje, P. McCullagh, and R. Harper; Univ. of Ulster, UK; Ulster Community and Hospitals Trust, UK

Session 4A (17:20-19:00, Joly Theatre)
Biomedical Data Analysis 2
Chair: Margaret Peterson, Hospital for Special Surgery, USA

A Spreadsheet Framework for Visual Exploration of Biomedical Datasets
S. Sarni, A. Maciel, R. Boulic, and D. Thalmann; Ecole Polytechnique de Lausanne, Switzerland

Application of a Digital Deconvolution Technique to Brain Temperature Measurement and Its Correlation with Other Physiological Parameters
C. Merino, M. L. Luis-Garcia, S. Hernandez, F. Martín, O. Casanova, D. Gómez, M. Castellano, and J. L. González-Mora; Univ. of La Laguna, Spain

Dynamic Response Measurement of Clinical Gas Analysers
K. Shakya, C. Deegan, F. Hegarty, and C. Markham; Institute of Technology Blanchardstown, Ireland; St. James's Hospital, Ireland; National Univ. of Ireland, Ireland

A Grid-based Stochastic Simulation of Unitary and Membrane Ca^{2+} Currents in Spherical Cells
V. Gonzalez-Velez and H. Gonzalez-Velez; Universidad Autonoma Metropolitana - Azcapotzalco, Mexico; Univ. of Edinburgh, UK

Session 4B (17:20-19:00, Salmon Theatre)
Special Track 1: Medical Image Analysis: Techniques and Applications 2
Chair: Irina Ilovici, Rensselaer Polytechnic Institute, USA

Computer-Aided Thyroid Nodule Detection in Ultrasound Images
D. Maroulis, M. Savelonas, S. Karkanis, D. Iakovidis, and N. Dimitropoulos; Univ. of Athens, Greece; Technological Educational Institute of Lamia, Greece; Euromedica Medical Center, Greece

Generating a Synthetic Diffusion Tensor Dataset
Ø. Bergmann, A. Lundervold, and T. Steihaug; Univ. of Bergen, Norway

Reducing the Computational Cost for Statistical Medical Image Analysis: An MRI Study on the Sexual Morphological Differentiation of the Corpus Callosum
D. Kontos, V. Megalooikonomou, and J. Gee; Temple Univ., USA; Univ. of Pennsylvania, USA

Biomedical Informatics Research Network: Integrating Multi-site Neuroimaging Data Acquisition, Data Sharing and Brain Morphometric Processing
J. Jovicich, M. F. Beg, S. Pieper, C. Priebe, M. Miller, R. Buckner, and B. Rosen; Massachusetts General Hospital, USA; Harvard Medical School, USA; Simon Fraser Univ., Canada; Brigham & Women's Hospital, USA; Johns Hopkins Univ., USA

Session 4C (17:20-19:00, Synge Theatre)
Special Track 3: Data Mining 2
Chair: Seppo Puuronen, University of Jyväskylä, Finland

Case-Based Tissue Classification for Monitoring Leg Ulcer Healing
M. Galushka, H. Zheng, D. Patterson, and L. Bradley; Univ. of Ulster, UK

Synopsis for Microbiological Data Stream Analysis
G. Cellarosi and C. Sartori; Università degli Studi di Bologna, Italy

Local Dimensionality Reduction within Natural Clusters for Medical Data Analysis
M. Pechenizkiy, A. Tsymbal, and S. Puuronen; Univ. of Jyväskylä, Finland; Trinity College Dublin, Ireland

Data Mining Methods Supporting Diagnosis of Melanoma
J. W. Grzymala-Busse and Z. S. Hippe; Univ. of Kansas, USA; Univ. of Information Technology and Management, Poland

June 24, 2005; Friday

Session 5A (9:50-11:30, Joly Theatre)
Network and Telemedicine Systems
Chair: Benjamin Jung, University of Victoria, Canada

Neuroimaging Services on the Net
V. Roberto, A. Zappia, C. Testa, and G. B. Frisoni; Univ. of Udine, Italy; LENITEM -FBF Brescia, Italy

Challenges of Ultra Large Scale Integration of Biomedical Computing Systems
R. Begent, M. Brady, A. Finkelstein, D. Gavaghan, P. Kerr, H. Parkinson, F. Reddington, and J. M. Wilkinson; NCRI Informatics Initiative, UK; Oxford Univ., UK; Univ. College London, UK

Handheld Medical Devices Negotiating for Reconfigurable Resources Using Agents
T. O'Sullivan and R. Studdert; Univ. College Cork, Ireland

Enabling Change in Healthcare Structures through Teleconferencing
B. Kane, S. Luz, G. Menezes, and D. Hollywood; Trinity College Dublin, Ireland

An Experimental System for Robotic Heart Surgery
H. Mayer, I. Nagy, A. Knoll, E. U. Schirmbeck, and R. Bauernschmitt; Tech. Univ. of Munich, Germany; German Heart Center Munich, Germany

Session 5B (9:50-11:30, Salmon Theatre)
Special Track 5: Wearable Systems for Homecare and Personalised Healthcare
Chair: Narayana Jayaram, London Metropolitan University, UK

A Wearable ECG-Recording System for Continuous Arrhythmia Monitoring in a Wireless Tele-home-care Situation
R. Fensli, E. Gunnarson, and T. Gundersen; Agder Univ. College, Norway; Hospital of Buskerud, Norway; Sorlandet Sykehus HF, Norway

Wearable ECG Recognition and Monitor
J. Dong, M. Xu, H.-H. Zhu, and W.-F. Lu; East China Normal Univ., China; Shanghai Jillion Software Co. Ltd., China

Web-Based Monitoring System for Home-Based Rehabilitation with Stroke Patients
H. Zheng, R. Davies, and N. Black; Univ. of Ulster, UK

A Vision for the Use of Proactive Mobile Computing Tools to Empower People with Chronic Conditions
A. Mathews and R. Butler; The Robert Gordon Univ., UK

Session 5C (9:50-11:30, Synge Theatre)
Special Track 9: Medical Multimedia Analysis and Content-based Retrieval
Chair: Wallapak Tavanapong, Iowa State University, USA

A Comparative Study of Texture Features for the Discrimination of Gastric Polyps in Endoscopic Video
D. Iakovidis, D. Maroulis, S. Karkanis, and A. Brokos; Univ. of Athens, Greece; Tech. Educational Institute of Lamia, Greece

Fractal Analysis of Image Textures for Indexing and Retrieval by Content
A. Balan, A. Traina, Jr., C. Traina, and P. Azevedo-Marques; Univ. of Sao Paulo, Brazil

Objective Grading of Facial Paralysis Using Artificial Intelligence Analysis of Video Data
S. McGrenary, D. O'Reilly, and J. Sorashan; Strathclyde Univ., UK

Texture-Based Image Retrieval for Computerized Tomography Databases
W. Tsang, A. Corboy, K. Lee, D. Raicu, and J. Furst; DePaul University, USA

Session 6A (11:50-13:30, Joly Theatre)
Medical Databases and Information Systems 1
Chair: Kudakwashe Dube, Dublin Institute of Technology, Ireland

Ontology Interaction with a Patient Electronic Health Record
O. Curé; Universite de Marne la Vallée, France

An Adaptable Assessment Generation System for Clinical Trials Complementing Human Research Information System
M. Vahabzadeh, J.-L. Lin, M. Mezghanni, A. Gupman, J. Schmittner, and K. Preston; National Institutes of Health, National Institute on Drug Abuse, USA

Relevance Feedback for Spine X-ray Retrieval
X. Xu, D J Lee, S. Antani, and L. R. Long; Brigham Young Univ., USA; National Library of Medicine, USA

Privacy of Medical Records: from Law Principles to Practice
B. Finance, S. Medjdoub, and P. Pucheral; INRIA Rocquencourt, France

Medical Knowledge Morphing: Towards Case-Specific the Integration of Heterogeneous Medical Knowledge Resources
S. Abidi; Dalhousie Univ., Canada

Session 6B (11:50-13:30, Salmon Theatre)
Special Track 6: Application of Gas Discharge Visualisation (GDV) Technique in Conventional and Complementary Medical Analysis
Chair: Konstantin Korotkov, Federal University of Informational Technologies, Mechanics and Optics, Russia

Analysis and Monitoring of the Human Energy State with Gas Discharge Visualization Technique
K. Korotkov; Federal Univ. of Informational Technologies, Mechanics and Optics, Russia

GDV Technology Applications for Cosmetic Sciences
A. Vainshelboim, M. Hayes, K. S. Momoh, C. Raatsi, S. Peirce, K. Korotkov, and N. Prijatkin; Aveda Corporation, USA; Federal Univ. of Informational Technologies, Mechanics and Optics, Russia

GDV Measures Vitality?
I. Kononenko, M. Sedej, and A. Sadikov; Univ. of Ljubljana, Slovenia

How Does the Gas Discharge Visualization Technique Assess a Body?
B. Williams; Center for Environmental Energy Medicine Studies, USA

Optimization of the Physiological Capacities at Human
The Bio-nutritional Assumption of Responsibility of Sportsman
C. Bordes and A. Chausse; Montagnes Altitude Santé, France

The Efficacy of the Gas Discharge Visualisation Technique as a Measure of Physical and Mental Health
P. Dobson and E. O'Keeffe; CASS Business School, UK

Session 6C (11:50-13:30, Synge Theatre)
Special Track 7: Intelligent Patient Management 1
Chair: Adele Marshall, Queen's University of Belfast, UK

An Evolutionary Computational Approach to Probabilistic Neural Network with Application to Hepatic Cancer Diagnosis
F. Gorunescu, M. Gorunescu, E. El-Darzi, and S. Gorunescu; Univ. of Medicine and Pharmacy of Craiova, Romania; Univ. of Craiova, Romania; Univ. of Westminster, UK

Using Social Integrity Constraints for On-the-Fly Compliance Verification of Medical Protocols
A. Ciampolini, P. Mello, M. Montali, and S. Storari; Univ. of Bologna, Italy; Univ. of Ferrara, Italy

A Tool for Studying the Effects of Residents' Attributes on Patterns of Length of Stay in Long-Term Care
H. Xie, T. Chaussalet, and P. Millard; Univ. of Westminster, UK

Hospital Care Watch (HCW): An Ontology and Rule-Based Intelligent Patient Management Assistant
V. Payne and D. Metzler; Univ. of Pittsburgh, USA

Session 7A (14:30-16:10, Joly Theatre)
Medical Databases and Information Systems 2
Chair: Jan Macek, University College Dublin, Ireland

Development of National Cardiovascular Information System (NCIS) in Ireland
M. R. Flynn, M. Lonergan, P. Kearney, and E. Shelley; Royal College of Surgeons, Ireland; Cork Univ. Hospital, Ireland

An Initial Investigation into the Role of Health Informatics in the Context of Global Health
G. Stephens and G. Woods; Trinity College Dublin, Ireland

Putting Fun into Function with *QuizMed* - An Interactive Medical Application
F. Bradley and B. Jung; Dataduct Technologies, Ireland; Univ. of Victoria, Canada

DICOM-X - Seamless Integration of Medical Images into the EHR
B. Jung; Univ. of Victoria, Canada

Supporting Collaboration and Information Sharing in Computer-Based Clinical Guideline Management
K. Dube, E. Mansour, and B. Wu; Dublin Institute of Technology, Ireland

Session 7B (14:30-16:10, Salmon Theatre)
Special Track 4: Bioinformatics and its Medical Applications
Chair: Nadia Bolshakova, Trinity College Dublin, Ireland

A High-Throughput Bioinformatics Distributed Computing Platform
T. Keane, A. Page, J. McInerney, and T. Naughton; National Univ. of Ireland, Ireland

Biclustering of Expression Data Using Simulated Annealing
K. Bryan, P. Cunningham, and N. Bolshakova; Trinity College Dublin, Ireland

An Ontology-Driven Clustering Method for Supporting Gene Expression Analysis
H. Wang, F. Azuaje, and O. Bodenreider; Univ. of Ulster, UK; National Library of Medicine, National Institutes of Health, USA

A Novel Computational Analysis of Heterogeneity in Breast Tissue
S. Maskery, Y. Zhang, R. Jordan, H. Hu, C. Shriver, J. Hooke, and M. Liebman; Windber Research Institute, USA; Walter Reed Army Medical Center, USA

Prediction of Type II MODY3 Diabetes Using Backpercolation
N. Khan, C. A. Ikejiaku, and S. Rahman; Middlesex Univ., UK

Session 7C (14:30-16:10, Synge Theatre)
Special Track 7: Intelligent Patient Management 2
Chair: Sally McClean, University of Ulster, UK

Markov Model-Based Clustering for Efficient Patient Care
S. McClean, M. Faddy, and P. Millard; Univ. of Ulster, UK; Queensland Univ. of Technology, Australia; Univ. of Westminster, UK

Classification of the Auditory Brainstem Response (ABR) Using Wavelet Analysis and Bayesian Network
R. Zhang, G. McAllister, B. Scotney, S. McClean, and G. Houston; Univ. of Ulster, UK; Royal Victoria Hospital, Belfast, UK

A Bayesian Approach to Modelling Inpatient Expenditure
B. Shaw and A. Marshall; Queen's Univ. of Belfast, UK

A Public Access Defibrillation Trial in Urban and Rural Communities in Northern Ireland: Developing the Roster Model
K. Cairns, A. Marshall, and F. Kee; Queen's University of Belfast, UK

Appraisal of a Conversational Artefact and Its Utility in Remote Patient Monitoring
L.-A. Black, M. McTear, N. Black, R. Harper, and M. Lemon; Univ. of Ulster, UK; Ulster Community Hospitals Trust, UK

Invited Talks and Tutorial

Invited Talk 1

June 23, 9:00-9:45, Joly Theatre

Supporting the Paradigm Shift in Life Sciences – The Rough Set Experience

Prof. Jan Komorowski
The Linnaeus Centre for Bioinformatics
Uppsala University and The Swedish University for Agricultural Sciences
Uppsala, Sweden

There is a paradigm shift in Life Sciences, which is particularly visible in biology that has moved from a data poor to a data rich science. High-throughput technologies such as, for instance, microarrays allow observing living organisms at an unprecedented level of detail. Huge amounts of biomedical literature overwhelm the researchers. We notice that biology and medicine come closer to each other and there is now a true possibility to combine molecular data with clinical findings. At the same time, the knowledge of biological phenomena is as yet mostly at the qualitative level; seldom is it possible to formulate concise equations that would model the phenomena at hand. Neither life science researchers nor computer scientists are fully prepared to work with these challenges.

By means of examples I shall illustrate some of the necessary ingredients for successful bioinformatics research in this area. Our recent developments include modelling combinatorial nature of gene regulation, predicting the origins of metastatic cancer, understanding the properties of a class of cell membrane proteins, predicting molecular function of proteins directly from their structure and predicting drug resistance of the HIV virus. Our methods include approaches to generating models from uncertain and inconsistent data (viz Rough Sets of Pawlak) and large ontologies such as Gene Ontology (Ashburner et al). Stringent statistical methods must be applied to validate the results. And last but not least, this enterprise requires collaboration.

Selected References

- *Rough sets.* Pawlak Z. Int. J. of Comp. Inf. Sci. 1982; 11:341-356.
- *Rough sets - theoretical aspects of reasoning about data.* Pawlak Z. Dordrecht: Kluwer Academic Publishers; 1991.
- *Gene Ontology: tool for the unification of biology.* The Gene Ontology Consortium. (2000) *Nature Genet.* 25: 25-29.
- *Discovering regulatory binding site modules using rule-based learning,* T. R. Hvidsten, B. Wilczyński, A. Kryshtafovych, J. Tiuryn, J. Komorowski and K. Fidelis, in press, Genome Res. (June 2005).
- *Markers of Adenocarcinoma Characteristic of the Site of Origin – Development of a Diagnostic Algorithm* J.L. Dennis, T.R. Hvidsten, J. Komorowski, E.C. Wit, A. Bell, I. Downie, J. Mooney, C. Verbeke, C. Bellamy, W.N. Keith and K.A. Oien, in press, Clinical Cancer Research.
- *A novel approach to fold recognition using sequence-derived properties from sets of structurally similar local fragments of proteins*, T. R. Hvidsten, A. Kryshtafovych, J. Komorowski and K. Fidelis, Proc of European Conference on Computational Biology 2003, Special Issue of Bioinformatics, pp. 81—91, Oxford University Press, 2003.
- *Predicting Gene Ontology Biological Process From Temporal Gene Expression Patterns* Astrid Lægreid, Torgeir R. Hvidsten, Herman Midelfart, Jan Komorowski, and Arne K. Sandvik, Genome Res. 2003 May; 13(5): 965-79
- *Learning rule-based models of biological processes from gene expression time profiles using Gene Ontology*, T.R. Hvidsten, A. Lægreid, J. Komorowski, Special Issue on microarrays of Bioinformatics journal, Oxford University Press, pp. 1116–1123.
- *A literature network of human genes for high-throughput gene-expression analysis*, (T.-K. Jenssen, A. Lægreid, J. Komorowski and E. Hovig), Nature Genetics, pp. 21—28,Vol 28, May 2001.
- *Modelling prognostic power of cardiac tests using rough sets*. J. Komorowski, A. Øhrn, Artificial Intelligence in Medicine 15(2): 167-191 (1999).

Invited Talk 2

June 23, 14:30-15:15, Joly Theatre

Population-Based Records: Supporting Biomedical Research

Prof. Jane Grimson
Centre for Health Informatics
Trinity College
Dublin, Ireland

Biomedical informatics is a developing field which brings together bioinformatics and health informatics. It focuses on genomic medicine, in particular, through the development of innovative software methodologies and tools which assist in unravelling the complex interplay between genotype and phenotype. The two fields complement one another with bioinformatics supporting "discovery science" and health informatics supporting healthcare delivery. The extent to which these two disciplines can come together under the umbrella of biomedical informatics will play a vital role in determining the speed of progress in genomic medicine.

One of the key challenges will be the ability to deliver high-quality clinical data from the patient record which can be linked with genetic information in a flexible, generic and secure manner. This requires the development of methodologies and tools to transform and filter the data in the patient record, enriching it with metadata to characterise the quality and provenance of the data, and presenting it in the form of integrated population-based electronic health records (PBHRs). This talk will present an overview of the problem and propose a possible approach to the development of a scaleable solution, which will be applicable across a range of health domains.

Invited Talk 3

June 24, 9:00-9:45, Joly Theatre

Clinical Data Analysis & Patient Management from Existing Patient Records

R. Bharat Rao, Ph.D.
Computer-Aided Diagnosis & Therapy
Siemens Medical Solutions USA, Inc.
Malvern, PA, USA

Medical knowledge is rapidly expanding: a plethora of new diagnostic tests, clinical guidelines on how to diagnose and treat patients, and evidence-based results from clinical trials are created and modified on a seemingly daily basis. It has become very difficult for physicians to constantly monitor these changes and ensure that patients are offered the best treatment. A key problem is that patient records collected by healthcare providers, even those in electronic form, contain data in a mixture of formats. Most of the useful clinical information is in unstructured form (text or images) and cannot be easily interpreted by computers in an automated fashion.

We describe a methodology to extract and combine information from multiple data sources in a principled fashion to support medical decision-making. This methodology has been used for a variety of medical applications, including automatically selecting therapies for individual patients and for patient identification for ongoing clinical trials, and at a population level to monitor guideline compliance and to support quality assurance initiatives. We describe the results of successfully applying this methodology over quarter million patients from different medical institutions. Our eventual goal is an automated decision-support assistant that can provide point-of-care assistance to the physician.

Tutorial
June 22, 14:00-17:00, Maxwell Theatre

Data Mining Large Medical Time Series Databases

Dr. Eamonn Keogh
University of California – Riverside
USA

Time series data is ubiquitous; large volumes of time series data are routinely created in medical and biological domains. Examples include gene expression data, electrocardiograms, electroencephalograms, gait analysis etc. Although statisticians have worked with time series for more than a century, many of their techniques hold little utility for researchers working with massive time series databases. In this tutorial we will learn how cutting edge data mining tools can be applied to medical problems.

There are a great many tasks involving medical time series, including: Indexing (query by content), Clustering, Classification, Prediction, Summarization, Visualization, Anomaly Detection and Segmentation. Note that indexing and clustering make *explicit* use of a distance measure, and many approaches to classification, prediction, association detection, summarization, and anomaly detection make *implicit* use of a distance measure. We will therefore take the time to consider time series similarity in detail. We will examine classic similarity measures such as Euclidean distance and Dynamic Time Warping and show how they can be adapted for different medical domains. Since medical datasets are often large, and are continually updated, we will take time to carefully consider how such techniques can be used to *efficiently* process the data and techniques to allow processing of streaming datasets.

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Special Track 1: Medical Image Analysis: Techniques and Applications

Irina Ilovici (USA, Co-chair)
Brian Manning (USA, Co-chair)
Charles (Chuck) R. Meyer (USA)
Leon Axel (USA)
Richard Carson (USA)
Mike King (USA)
Ron Kikinis (USA)
Shawn C. Black (USA)
Laigao Michael Chen (USA)

Special Track 2: Intelligent Data Analysis of Electrocardiogram Data

Chris Nugent (Northern Ireland, Co-chair)
Dewar Finlay (Northern Ireland, Co-chair)
Paul McCullagh (Northern Ireland, Co-chair)
Norman Black (Northern Ireland)
Werner Dubitzky (Northern Ireland)
Jan Kors (The Netherlands)
Robert Lux (USA)
Peter MacFarlane (Scotland)

Special Track 3: Data Mining

Mykola Pechenizkiy (Finland, Co-chair)
Seppo Puuronen (Finland, Co-chair)
Werner Dubitzky (UK)
Charles E. Kahn (USA)
Peter Kokol (Slovenia)
Andrei L Turinsky (Canada)
Stephen Wong (USA)

Special Track 4: Bioinformatics and its Medical Applications

Nadia Bolshakova (Ireland, Chair)
Francisco Azuaje (Northern Ireland)
Des Higgins (Ireland)
Fernando Martin-Sanchez (Spain)

Special Track 5: Wearable Systems for Homecare and Personalised Healthcare

Narayana Jayaram (UK, Chair)
Robert Whitrow (UK)
Mike Smith (UK)
Frank Wang (UK)
Igor Schagaev (UK)

Special Track 6: Application of Gas Discharge Visualisation (GDV) Technique

Konstantin Korotkov (Russia, Chair)
Alex Vainshelboim (USA)

Special Track 7: Intelligent Patient Management

Adele Marshall (UK, Co-chair)
Sally McClean (UK, Co-chair)
Elia El-Darzi (UK)
Thierry Chaussalet (UK)
Peter Millard (UK)

Special Track 8: Grids for Biomedicine and Bioinformatics

Maria Mirto (Italy, Co-chair)
Giovanni Aloisio (Italy, Co-chair)
Almerico Murli (Italy, Co-chair)
Dave S. Angulo (USA)
Alberto Apostolico (Italy)
Vincent Breton (France)
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Andreas R. Formiconi (Italy)
Ian Foster (USA)
Carole Goble (UK)
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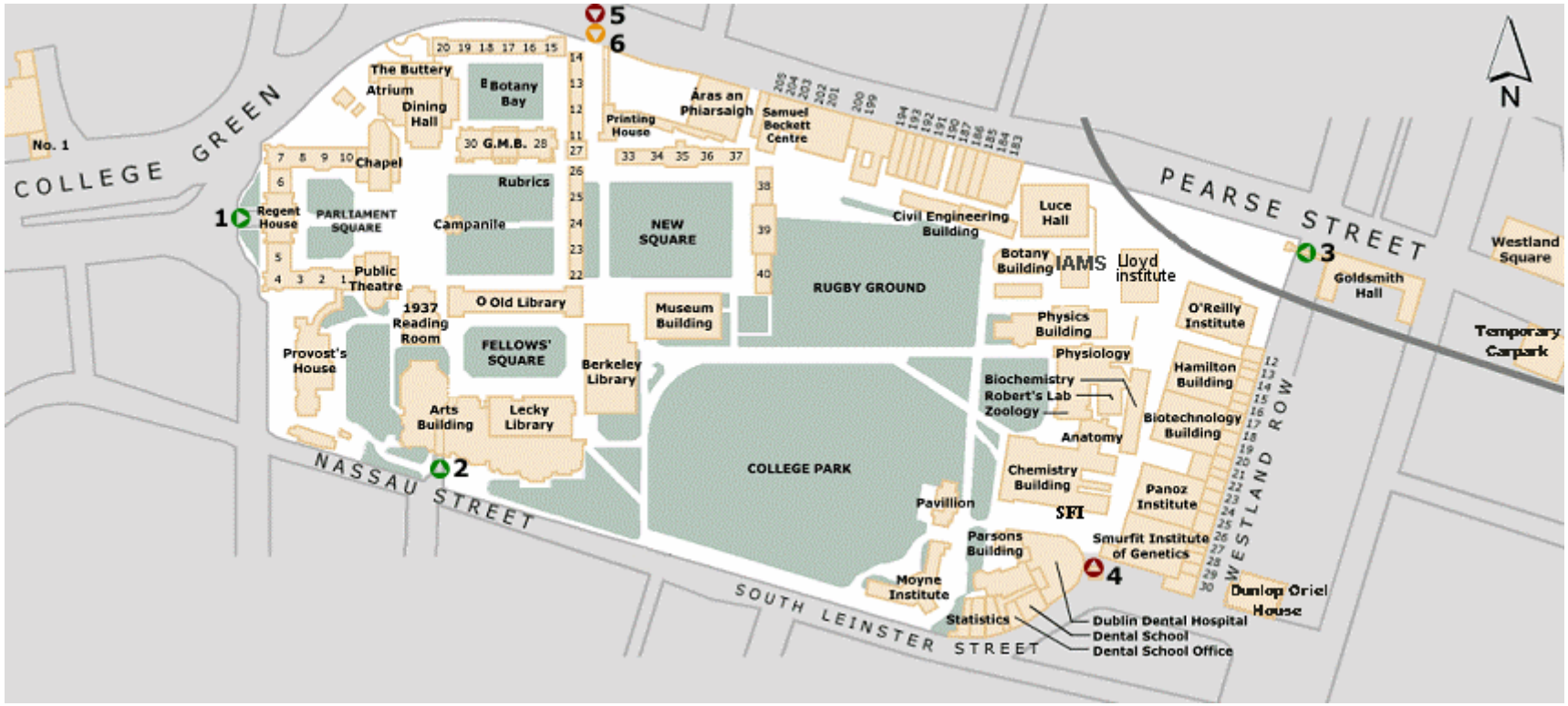
Robert L. Martino (USA)
Sofie Nørager (Belgium)
Cecilia Saccone (Italy)
Francesco Sicurello (Italy)
Tony Solomonides (UK)
Giuliano Laccetti (Italy)
Andreas Gisel (Italy)
John Brooke (UK)

Special Track 9: Medical Multimedia Analysis and Content-based Retrieval

Wallapak Tavanapong (USA)
Johnny Wong (USA)
JungHwan Oh (USA)
Piet C. de Groen (USA)

TRINITY COLLEGE DUBLIN

COLLEGE MAP



1. Front Gate Entrance
0700hrs-0000hrs (Weekdays)
0800hrs-1800hrs (Weekends/Bank Holidays)

2. Arts Building/Nassau Street Entrance
0800hrs-2230hrs (Weekdays)
0800hrs-0000hrs (Saturday)
0930hrs-0000hrs (Sundays, 1st June-30th September)
1130hrs-0000hrs (Sundays, 1st October - 31st May)

3. Westland Row Entrance
0700hrs-1930hrs (Weekdays only)
1930hrs-0000hrs (Swipe access only)

4. Lincoln Place Entrance
0700hrs-0000hrs (Weekdays only)
0800hrs-0000hrs (Saturdays. Sundays, Bank Holidays)

5. Pearse Street Gate West Entrance
0800hrs-1000hrs (Weekdays only)
1600hrs-1830hrs (Weekdays only)

6. Pearse Street Gate West Pedestrian Entrance
24 Hour Access (Key required)

IEEE CBMS 2005: Overview

	Wednesday	**Thursday**		
9:00-9:45		Opening and Invited Talk 1: Prof. Jan Komorowski *Joly*		
9:50-11:30		Session 1A: Medical Imaging *Joly*	Session 1B: Decision Support Systems *Salmon*	Session 1C: ST8: Grids 1 *Synge*
11:30-11:50		Coffee break		
11:50-13:30		Session 2A: Knowledge-Based Systems *Joly*	Session 2B: ST2: Intelligent Data Analysis of Electrocardiogram Data *Salmon*	Session 2C: ST8: Grids 2 *Synge*
13:30-14:30		Lunch		
14:30-15:15	Tutorial on Data Mining: Dr. Eamonn Keogh (14:00-17:00) *Maxwell*	Invited Talk 2: Prof. Jane Grimson *Joly*		
15:20-17:00		Session 3A: Biomedical Data Analysis 1 *Joly*	Session 3B: ST1: Medical Image Analysis 1 *Salmon*	Session 3C: ST3: Data Mining 1 *Synge*
17:00-17:20	Reception (17:00-19:00)	Coffee break		
17:20-19:00		Session 4A: Biomedical Data Analysis 2 *Joly*	Session 4B: ST1: Medical Image Analysis 2 *Salmon*	Session 4C: ST3: Data Mining 2 *Synge*
19:45-22:00		Dinner		

	Friday		
9:00-9:45	Invited Talk 3: Dr. R. Bharat Rao *Joly*		
9:50-11:30	Session 5A: Network and Telemedicine Systems *Joly*	Session 5B: ST5: Wearable Systems *Salmon*	Session 5C: ST9: Multimedia Analysis *Synge*
11:30-11:50	Coffee break		
11:50-13:30	Session 6A: Medical Databases and Information Systems 1 *Joly*	Session 6B: ST6: Gas Discharge Visualisation (GDV) Technique *Salmon*	Session 6C: ST7: Intelligent Patient Management 1 *Synge*
13:30-14:30	Lunch		
14:30-16:10	Session 7A: Medical Databases and Information Systems 2 *Joly*	Session 7B: ST4: Bioinformatics *Salmon*	Session 7C: ST7: Intelligent Patient Management 2 *Synge*