BIOINFORMATICS AND MEDICAL INFORMATICS

DESCRIPTION

The area Bioinformatics and Medical Informatics aims at developing and exploring computational and data models, platforms and algorithms arising in different contexts in the fields of bioinformatics and biomedical imaging. In bioinformatics, research focuses on several topics, as computational systems biology, natural computing, computational genomics and algorithmic bioinformatics. In medical informatics, the research focuses in general on biomedical data (including images and signals) processing and management. More particularly, people of this area study healthcare and clinical process-aware information systems, clinical databases and data warehouses, clinical data mining. Biomedical imaging regards the investigation of image and signal processing, computer graphics and visualization, computer vision, machine learning and statistical pattern recognition specifically tailored for the application to multi-modal and multi-dimensional medical and biological data.

LABORATORIES

CBMC: Center for BioMedical Computing
STARS: Semistructured Temporal clinicAl GeogRaphical Systems
VIPS: Vision, Image Processing, and Sound

PROJECTS (2012-2017)

- **AHeAD, Automatic Human behavior Analysis in neurological Diseases: the case of epilepsy** (in collaboration with the Dept. of Neurology and EBNeuro s.r.l.), 2012: Joint Project.
  The aim of the project is to create an expert system able to modeling the patients' behavior based on video recordings.
- **Investigation of structural and functional brain connectivity from multimodal data** - Joint Projects 2014.
  The goal of the project is the investigation of the structural and functional brain connection networks as well as of their interdependencies in both healthy and pathological conditions.
- **Brain microstructural modeling for improved TMS anchoring** - Joint Projects 2015.
  The project aims at investigating new signal reconstruction methods from diffusion MRI allowing an improved description of microstructural properties and at assessing their impact on the accurate anchoring of the TMS electromagnetic field by the consequentially identified neuronal axons' orientation and microstructural features.
- **DSurf: scalable Computational method for 3D printing surface (PRIN 2015**).
  The project aims at developing advanced Computer Graphics technologies for digital manufacturing. The task of the unit in Verona is related to the measurement and characterization of surface appearance and geometrical properties.
- **Thripsis-Finder. Developing a computational platform for analysis of genomes subjected to chromothripsis phenomena** (in collaboration with Personal Genomics and Università di Firenze and Azienda Ospedaliero Universitaria Meyer di Firenze), Ricerca di base 2015.
  The project intends to provide advanced algorithms for the understanding and the clinical evaluation of Chromothipsis phenomena, which determine macro-alterations in the structure of human chromosomes, by combining and amplifying modifications that are typical of a wide class of pathologies.
- **PREDYCOS: Personalized REsponsive Dynamic COmplex System** Joint Project 2016.
  This project aims to construct predicting models to study the dynamics of complex evolving systems from biological to social science area.
- **Strumenti di analisi dei dati della Rete nazionale di Farmacovigilanza (RNFV).**
  2011-2016 - Funded by AIFA (Associazione Italiana del Farmaco) The project aims to support the pharmacovigilance activities through Data Warehouse, OLAP, and data mining methods and technologies.

SELECTED PUBLICATIONS (2012-2016)

- Carlo Combi, Barbara Oliboni: Visually defining and querying consistent multi-granular clinical temporal abstractions. Artificial Intelligence in Medicine 54(2): 75-101 (2012)
- Elisa Veronese, Umberto Castellani, Denis Peruzzo, Marcella Bellani, Paolo Brambilla: Machine Learning Approaches: From Theory to Application in Schizophrenia. Comp. Math. Methods in Medicine 2013: 867924:1-867924:12 (2013)
- P. Lovato, M. Bicego, C. Segalin, A. Perina, N. Sebe, M. Cristani. "Faved! biometrics: tell me which image you like and I"ll tell you who you are", IEEE Transactions on Information Forensics & Security, vol. 9(3), pp. 364-374, (2014)
- Alberto Castellini, Giuditta Franco, Alessio Milanese: A genome analysis based on repeat sharing gene networks. Natural Computing 14(3): 403-420 (2015)
- Carlo Combi, Matteo Mantovani, Alberto Sabaini, Pietro Sala, Francesco Amaddeo, Ugo Moretti, Giuseppe Pozzi: Mining approximate temporal functional dependencies with pure temporal grouping in clinical databases. Comp. in Bio. and Med. 62: 306-324 (2015)
- Pietro Lovato, Alejandro Giorgetti, Manuele Bicego: A Multimodal Approach for Protein Remote Homology Detection. IEEE/ACM Trans. Comput. Biology Bioinform. 12(5): 1193-1198 (2015)
- S. Ullo, V. Murino, A. Maccione, L. Berdondini, D. Sona, "Bridging the Gap in Connectomic Studies: A Particle Filtering Framework for Estimating Structural Connectivity at Network Scale Medical Image Analysis", Medical Image Analysis, Vol. 21, No. 1, pp. 1-14, April (2015)
- Vincenzo Bonnici, Vincenzo Manca: Informational Laws of Genome Structures, Nature Scientific Reports (6) 28840 doi: 10387srep28840 (2016)
- Vincenzo Bonnici, Federico Busato, Giovanni Micale, Nicola Bombieri, Alfredo Pulvirenti, Rosalba Giugno: APPAGATO: an APproximate PArallel and stochastic GrAph querying TOol for biological networks. Bioinformatics 32(14): 2159-2166 (2016)
- A. Daducci, A. Dal Palú, M. Descoteaux, J.-Ph. Thiran. Microstructure informed tractography: pitfalls and open challenges, Front Neurosci. 10: 247 (2016)
- Garro, V., Giachetti, A., Scale space graph representation and kernel matching for non rigid and textured 3D shape retrieval. IEEE Transactions on Pattern Analysis and Machine Intelligence, 38(6): 1258-1271 (2016)
- D. Bartha, P. Burcsi, Zs. Lipták: Tree Reconstruction from Jumbled and Weighted Subtrees. Proc. of the 27th Annual Symposium on Combinatorial Pattern Matching (CPM 2016), LIPIcs 54:10:1-10:13 (2016)
- Storti S.F., Khan S., Boscolo Galazzo I., Manganotti P., Menegaz G., Exploring the Epileptic Brain Network using Time-Variant Effective Connectivity and Graph Theory, IEEE Journal of Biomedical and Health Informatics (J-BHI)(2016)

PEOPLE (2017)

Manuele Bicego
Assistant Professor
manuele.bicego@univr.it
+39 045 802 7072

Umberto Castellani
Assistant Professor
umberto.castellani@univr.it
+39 045 802 7988

Ferdinando Cicalese
Associate Professor
ferdinando.cicalese@univr.it
+39 045 802 7969

Carlo Combi
Full Professor
carlo.combi@univr.it
+39 045 802 7985

Marco Cristani
Associate Professor
marco.cristani@univr.it
+39 045 802 7841

Alessandro Daducci
Assistant professor
alessandro.daducci@univr.it

Giuditta Franco
Assistant Professor
giuditta.franco@univr.it
+39 045 802 7045

Andrea Giachetti
Associate Professor
andrea.giachetti@univr.it
+39 045 802 7998

Rosalba Giugno
Associate Professor
rosalba.giugno@univr.it
+39 045 802 7066

Zsuzsanna Lipták
Assistant Professor
zsuzsanna.liptak@univr.it
+39 045 802 7032

Vincenzo Manca
Full Professor
vincenzo.manca@univr.it
+39 045 802 7981

Gloria Menegaz
Full Professor
gloria.menegaz@univr.it
+39 045 802 7024

Vittorio Murino
Full Professor
vittorio.murino@univr.it
+39 045 802 7996

Barbara Oliboni
Assistant Professor
barbara.oliboni@univr.it
+39 045 802 7077