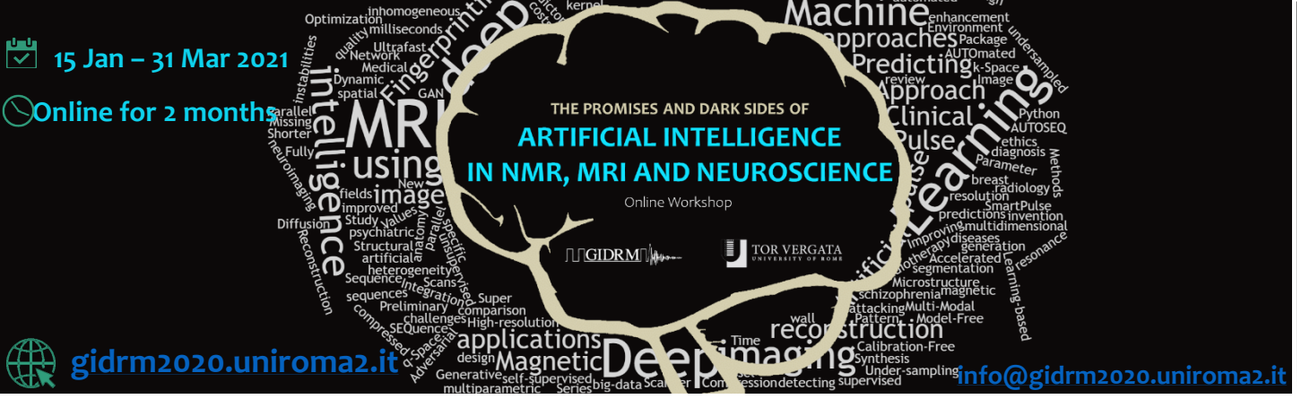

TOPICS

- **Hardware and sequence design through AI**
- **AI for image reconstruction**
- **AI for image analysis and statistical inference**
- **Interpretability and Explainability**
- **Clinical Applications**
- **Current challenges and future perspectives**

The primary goal of this workshop is to bring together the diverse but overlapping communities of physicists, chemists, computer scientists, biologists, clinicians and neuroscientists to explore novel, out-of-the box angles through which trans-disciplinary challenges in NMR, MRI and neuroscience research and technology can be tackled using Artificial Intelligence. This will include proposing a vision of the most promising directions and short/mid-term future scientific, technological, ethical and regulatory synergies.

PRACTICAL INFO

- **Jan 15th –Mar 31st, 2021 – Asynchronous Workshop:** All talks will be recorded in advance and available anytime to all attendees and spearkers. Every talk is coupled to a **virtual discussion room** for asynchronous Q&A at gidrm2020.uniroma2.it
- **Registration** (deadline: Feb 14, 2021) will be handled thorough GIDRM – click here to register.
- **Fees: Free for 2020 GIDRM members. GIDRM Membership is € 35 ($41) for non-GIDRM members - € 20 ($25) if you are aged under 28.** Includes 1-year GIDRM membership (valid through 2021) and free access to all 2021 GIDRM days and school held online.
- **30 ECM credits included** for Medical Doctors, Physicists, Chemists (National Italian Health System), accreditation provided by biomedia (accessible Feb 19°-March 31°)

Local Organizing Committee
Prof. Nicola Toschi – Prof. Maria Guerrisi – Dr. Andrea Duggento
Dr. Allegra Conti – Dr.Silvia Minosse- Dr. Francesco Di Ciò-Dr. Antonio Canichella
Scientific Committee
Marco Geppi - Marcello Alecci - Silvia Borsacchi - Mariapina D'Onofrio
Simonetta Geninatti Crich - Giacomo Parigi - Giuseppe Pileio
Nicola Toschi – Maria Guerrisi – Francesco G. Garaci – Roberto Floris
Federico Giove - Andrea Duggento - Allegra Conti Silvia Minosse- Francesco Di Ciò

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Asynchronous Workshop (Jan 15th - March 31st 2020)

Marco Geppi – University of Pisa (Italy) - **Opening remarks**

Nicola Toschi – University of Rome Tor Vergata (Italy) - **Welcome and introduction to the workshop**

Andrea Duggento – University of Rome Tor Vergata (Italy) - **Focused introduction to deep learning for biomedical applications**

Hardware and sequence design through AI

Keynote Lectures

Florian Knoll – NYU Langone Health (United States) – ***"Potential and potential pitfalls of AI for the diagnostic MRI pipeline"***
Jongho Lee – Seoul National University (Republic of Korea) –***"Deep Designed RF"***

Oral Communications

Manu Veliparambil Subrahmanian/Gianluigi Veglia – University of Minnesota (United States) – **"Artificial Intelligence in RF Pulse Design: from High Resolution NMR to Imaging"**
Mads Sloth Vinding – Aarhus University (Denmark) – **"Optimal and DeepControl in MRI pulse sequence"**

AI for image analysis and statistical inference

Keynote Lectures

Chen Qin - The University of Edinburgh (United Kingdom) -***"Deep Learning for Dynamic MRI Reconstruction"***
Daniel Remondini / Gastone Castellani – Bologna University (Italy)
"Artificial Intelligence in MRI: from raw data to analysis«

Oral Communications

Guy Gaziv - Weizmann Institute of Science (Israel) – ***"Self-Supervised Natural Image Reconstruction and Rich Semantic Classification from Brain Activity"***
Marco Palombo – University College London (United Kingdom) - ***"Machine Learning Applications to Microstructure Imaging through Diffusion MRI"***
Tiago Azevedo – University of Cambridge (United Kingdom) - ***"A Deep Graph Neural Network Architecture for rs-fMRI Data"***
Mike Germuska – Cardiff University (United Kingdom), **"Robust estimation of cerebral oxygen metabolism with machine learning"**
Giovanna Maria Dimitri – Università degli Studi di Siena (Italy)- ***"Brain MRI segmentation and reconstruction. A Deep Learning perspective"***
Simeon Spasov – University of Cambridge (United Kingdom)- ***"Overcoming the challenges of data paucity in deep learning for neuroimaging***

Current challenges and future perspectives

Keynote Lectures

Donatello Apollusion Gassi – Amazon Web Services (AWS),
Giuseppe Leonardo Cascella – Idea75 **"Unstructured data, ML and AI for healthcare and industry 4.0 applications"**
Roberto Basili – University of Rome Tor Vergata (Italy)
"Interpretability and Explainability in Machine Learning: lesson learnt, challenges and directions from a NLP perspective"
Stefano Diciotti – Bologna University (Italy)- ***"Current challenges and future perspectives of machine learning techniques in medical imaging«***

Oral Communications

Fabio Massimo Zanzotto – University of Rome Tor Vergata (Italy) - ***"Clinician-in-the-loop AI: for a fairer model of clinical knowledge exploitation"***
Marcello Cadioli - Philips Healthcare (Italy) ***"AI for MRI: An industrial perspective and outlook"***
Birgi Tamersoy – Siemens Healthcare (Italy) - ***"AI for healthcare"***

AI for image reconstruction

Keynote Lectures

Andreas Maier – Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany) ***"Known Operator Learning - An approach to unite machine learning, signal processing, and physics"***
Jong Chul Ye – Korea Advanced Institute of Science and Technology (Republic of Korea) - ***"Unsupervised deep learning for MR reconstruction using physics-informed cycleGAN«***

Oral Communications

Vegard Antun – University of Oslo (Norway) - **"AI generated hallucinations in the sciences - On the stability accuracy trade-off in deep learning"**
Mehmet Akcakaya – University of Minnesota (United States) - ***"Self-Supervised Deep Learning of MRI Reconstruction without Reference Data"***

Interpretability and Explainability

Keynote Lectures

Paul Rad – The University of Texas at San Antonio (United States) - ***"Explainable and Robust Deep Learning for Medical Domain"***

Oral Communications

Riccardo Guidotti – University of Pisa (Italy) – ***"Explaining Explanation Methods: from LIME to DoctorXAI***
David Schneeberger – University of Vienna (Austria) –***"Quo vadis Europe? A comparative outlook at proposed explainability regulation"***

AI for neuroscience and clinical applications

Keynote Lectures

Duygu Tosun-Turgut – San Francisco Veterans Affairs Medical Center (United States) - ***"Impact of AI and deep learning on imaging of neurodegenerative diseases"***
Hugo Aerts – Harvard Medical School, Boston (United States) - ***"Artificial Intelligence in Cancer Imaging"***
Federica Agosta – Vita-Salute San Raffaele University (Italy) - ***"Artificial intelligence for early diagnosis and clinical decision making in neurodegenerative disorders"***
Hugo G. Schnack – UMC Utrecht (Netherlands) - ***"AI for psychiatric imaging: promises and challenges"***
Maryellen L. Giger – The University of Chicago (United States) **" Machine Learning on MRI of Breast Cancer"**

Oral Communications

Allegra Conti – University of Rome Tor Vergata (Italy) - ***"Dissecting the progression of multiple sclerosis through explainable ML techniques"***
Antonio Maria Chiarelli – G. D'Annunzio University (Italy) - ***"A Machine Learning Framework for Assessing the Effect of Prematurity on MRI Metrics of Functional Connectivity and Regional Brain Structure"***
Patrick Bolan – University of Minnesota (United States) - ***"Improving Advanced Imaging Workflows with AI"***
Tommaso Banzato – University of Padova (Italy) -**"Clinical Applications of AI in Diagnostic Imaging"**
Claudio Luchinat – University of Florence (Italy) - ***"Predictive models from metabolomic data"***