

IVMSP 2022

Image, Video, and Multidimensional Signal Processing Workshop



***2022 IEEE 14th Image, Video, and Multidimensional Signal
Processing Workshop***

June 26 - June 29, 2022

Nafplio, Greece

Program Guide



Welcome Message from the General Chairs

On behalf of our whole Organizing Committee and the IEEE Signal Processing Leadership, it is our great pleasure and honor to welcome you at the 2022 IEEE 14th Image, Video, and Multidimensional Signal Processing Workshop (IVMSP 2022), which takes place in Nafplio from June 26 to June 29 and is held at the Vouleftikon.

Over the past seven months the Organizing Committee, the IEEE Signal Processing Society staff, the personnel of the Research Committee of the Aristotle University of Thessaloniki, and our professional conference services provider Dimitrios Kalantzis from DSDC (www.dsdc.gr) have been enthusiastically investing energy and time to prepare a high-quality international workshop coupled with networking opportunities and enjoyable social events. IVMSP 2022 was decided to follow the footsteps of the preparation of the event cancelled in 2020. Although IVMSP 2022 is a hybrid event, participation in-person has been encouraged as an attempt to return to prior to coronavirus era tradition. The result is a rich synthesis of a tutorial, three keynote talks by internationally acclaimed scholars, technical papers in regular and special sessions on frontier research topics. We are grateful to all members of the Organizing Committee, the tutorial presenter, the keynote speakers, the authors, and the reviewers: they have all contributed to provide an exciting and up-to-date technical program of the highest quality.

We are indebted to our gold sponsor Meta for their generous support to IVMSP 2022.

Nafplio (Greek: Ναύπλιο, Nauplio or Nauplion in Italian and other Western European languages) is a coastal city in the Peloponnese in Greece that has expanded up the hillsides near the north end of the Argolic Gulf. The town was an important seaport held under a succession of royal houses in the Middle Ages as part of the lordship of Argos and Nauplia, held initially by the de la Roche following the Fourth Crusade before coming under the Republic of Venice and, lastly, the Ottoman Empire. It was the capital of the first Hellenic State. The venue of IVMSP 2022 is Vouleftikon in Syntagma (Constitution) Square in the center of Nafplio. This historical building was the seat of the Hellenic Parliament from autumn of 1825 until the spring of 1826. Landmarks in Nafplio are Palamidi Castle, Nafplio promenade, Acronafplia Fortress, Bourtzi island, and many churches and historical buildings. Nearby archaeological sites worth visiting include Mycenae, Nemea, Epidaurus, and ancient Tiryns.

We hope that all of you will be enticed by the scientific and social program of IVMSP 2022 as well as attracted by the natural beauty of Nafplio to both enjoy this exciting event and keep it in your memories.

Constantine Kotropoulos and Christophoros Nikou, General Chairs

Petros Maragos, Thrasyvoulos Pappas, and Athanassios Skodras, General Co-Chairs

Welcome Message from the Technical Chairs

Welcome to Nafplio, Greece for the 2022 IEEE 14th *Image, Video, and Multidimensional Signal Processing Workshop (IVMSP 2022)*.

IVMSP is established as a world-wide meeting for science and technology, as well as a forum of great importance for scientists, engineers, and practitioners throughout the world. The conference has been organized to encompass both the theory and technology, and both design and applications in the areas of image, video, and multi-dimensional signal processing. In IVMSP 2022, the authors will present their latest research results, ideas, developments, and applications.

We are pleased that IVMSP 2022 attracted a good number of high-quality contributions. 79 papers have been submitted to regular sessions, of which 57 have been accepted, yielding an acceptance ratio of 72%. These papers are divided in 9 regular sessions. We also have 3 special sessions, that include another 13 papers. We would like to thank the Special Session Chairs Kjersti Engan, University of Stavanger, Norway and Kostas Plataniotis, University of Toronto, Canada and the special session organizers, who were responsible for the general theme of their sessions, speaker invitations and assessing the quality of submissions. The special sessions and their organizers are:

- Multimodal Fusion, Analysis, and Retrieval (organized by Ilias Gialampoukidis, Stefanos Vrochidis, and Ioannis Compatsiaris, Centre for Research and Technology Hellas, Greece; Ioannis Papoutsis, Vassilios Sitokonstantinou, Charalambos Kontoes, National Observatory of Athens, Greece; Guido Vingione, Serco SpA, Italy)
- Multispectral Sensing and Surveillance Applications (organized by Thirimachos Bourlai, University of Georgia, U. S. and Panagiotis Karampelas, Hellenic Air Force Academy, Greece)
- Digital Pathology (organized by Kjersti Engan, University of Stavanger, Norway and Valery Naranjo, Polytechnical University of Valencia, Spain)

The technical program features three keynote lectures by:

- Alex Dimakis, University of Texas Austin, U. S. on “Deep Generative Models and Inverse Problems”;
- Avidesh Zakhori, University of California Berkeley, U. S. on “Applications of Multimodal Signal Processing to Combat Covid-19 Misinformation and Contact Tracing”;
- Ioannis Katsavounidis, Meta, U. S. on “Energy Efficient Video Processing”.

Of special interest is also the tutorial by Petros Maragos, National Technical University of Athens on “Introduction to Tropical Geometry and Its Applications to Machine Learning.

We would like to take this opportunity to extend special thanks to our keynote speakers and the tutorial presenter for their contributions to the conference program.

Special thanks must be given to the authors of all submitted manuscripts, for their contributions that resulted in a high-quality Technical Program, the reviewers for their hard work and careful judgment. We would like also to thank the IEEE for publishing the papers in IEEE Explore Digital Library.

We are looking forward to an exciting, vibrant assembly in our venue and welcome both past and new attendees.

Eduardo A. B. da Silva and Tasos Dagiuklas

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Guangtao Zhai, Shanghai Jiao Tong University

Sunday June 26, 2022

Tutorial: Petros Maragos

Session Chair: Christophoros Nikou, University of Ioannina

🕒 Sun, Jun 26, 12:00 – 13:30

📍 Vouleftikon

SUN-PM1: Smart Cities

Session Chairs: Constantine Kotropoulos, Aristotle University of Thessaloniki
Anastasios Tefas, Aristotle University of Thessaloniki

🕒 Sun, Jun 26, 15:30 – 17:00

📍 Vouleftikon

- **Deep Learning for On-Street Parking Violation Prediction** (15m)
Nikolaos Karantaglis (Aristotle University of Thessaloniki), Nikolaos Passalis (Aristotle University of Thessaloniki), Anastasios Tefas (Aristotle University of Thessaloniki)
- **Image Driven Optimal Personalized Route Recommendation** (15m)
Ioannis Sarridis (Aristotle University of Thessaloniki), George Karantaidis (Aristotle University of Thessaloniki), Constantine Kotropoulos (Aristotle University of Thessaloniki)
- **Rain Estimation from Smart City's E-band Links** (15m)
Roy Janco (Tel Aviv University), Hagit Messer (Tel Aviv University), Jonatan Ostrometzky (Tel Aviv University)
- **Context Enhanced Traffic Segmentation: Traffic Jam and Road Surface Segmentation from Aerial Image** (15m)
Yubo Wang (Waseda University), Zhao Wang (NTT), Yuusuke Nakano (NTT Network Technology Laboratories), Ken Nishimatsu (NTT), Katsuya Hasegawa (Japan Aerospace Exploration Agency), Jun Ohya (Waseda University)
- **Robust 4D Awareness via Diffusion Adaptation over Connected and Automated vehicles** (15m)
Nikos Piperigkos (University of Patras/ATHENA Research Center), Stavros Nousias (Industrial Systems Institute, Athena Research Center), Aris Lalos (Industrial Systems Institute, Athena Research Center)
- **Road Crack Detection Using Quaternion Neural Networks** (15m)

Aggelos Katsaliros (University of Ioannina), Iason-Ioannis Panagos (University of Ioannina), Giorgos Sfikas (University of West Attica), Christophoros Nikou (University of Ioannina)

SUN-PM: Coffee Break

🕒 Sun, Jun 26, 17:00 – 17:30

📍 Xenon / Napoli Di Romania / 3Sixty

SUN-PM2: Image Synthesis – Generation

Session Chair: Giorgos Sfikas, University of West Attica,

🕒 Sun, Jun 26, 17:30 – 19:00

📍 Vouleftikon

- **Novel View Synthesis for Sparse RGB-D Camera Networks** (15m)
Anh Truong (IPI - Ghent University - imec), Wilfried Philips (IPI - Ghent University - imec), Nikos Deligiannis (Vrije Universiteit Brussel)
- **Temperature Estimation in Fusion Devices Using Machine Learning Techniques on Infrared Specular Synthetic Data** (15m)
Alexis Juven (French Alternative Energies and Atomic Energy Commission), Marie-Hélène Aumeunier (French Alternative Energies and Atomic Energy Commission), Mouloud Adel (Institut Fresnel), Roberto Miorelli (CEA LIST), Xavier Artousi (CEA List), Christophe Reboud (CEA List)
- **SinGAN-3D: Towards Unconditioned 3D Shapes Generation** (15m)
Zeno Sambugaro (University of Trento), Nicola Conci (University of Trento), Marco Merlin (University of Trento)
- **An Architecture for the Detection of GAN-generated Flood Images with Localization Capabilities** (15m)
Jun Wang (University of Siena), Omran Alamayreh (University of Siena), Benedetta Tondi (University of Siena), Mauro Barni (University of Siena)
- **Joint Power and Contrast Shrinking in RGB Images with Exponential Smoothing** (15m)
Maria Trigka (University of Patras), Elias Dritsas (University of Patras), Konstantinos Moustakas (University of Patras)
- **View-consistent 4D Light Field Style Transfer using Neural Networks and Over-segmentation** (15m) Maryam Hamad (Instituto de Telecomunicações, Instituto Universitário de Lisboa), Caroline Conti (Instituto de

Telecomunicações, Instituto Universitário de Lisboa), Paulo Nunes (Instituto de Telecomunicações, Instituto Universitário de Lisboa), Luis Ducla Soares (Instituto de Telecomunicações, Instituto Universitário de Lisboa)

Opening Ceremony

🕒 Sun, Jun 26, 19:00 – 20:00

📍 Vouleftikon

Welcome Reception

🕒 Sun, Jun 26, 20:15 – 21:15

📍 Napoli Di Romania

Monday June 27, 2022

Keynote 1: Alex Dimakis

Session Chair: Petros Maragos

🕒 Mon, Jun 27, 09:00 – 10:00

📍 Vouleftikon

MON-AM1: Biomedical Applications

Session Chairs: Stefanos Kollias, National Technical University of Athens
Sokratis Makrogiannis, Delaware State University

🕒 Mon, Jun 27, 10:00 – 11:30

📍 Vouleftikon

- **Classification of ECG Signals of Heart Beats using TF-TS LSTM with Augmented Fuzzy Recurrence Eigenvalues** (15m)
Tuan D. Pham (Prince Mohammad Bin Fahd University)
- **A Large Imaging Database and Novel Deep Neural Architecture for Covid-19 Diagnosis** (15m)
Anastasis Arsenos (National Technical University of Athens), Dimitrios Kollias (Queen Mary University London), Stefanos Kollias (National Technical University of Athens)
- **Federated learning for heart segmentation** (15m)

Thibaud Misonne (UCLouvain), Sébastien Jodogne (UCLouvain)

- **EndoVAE: Generating Endoscopic Images with a Variational Autoencoder** (15m)

Dimitrios Diamantis (University of Thessaly), Panagiota Gatoula (University of Thessaly), Dimitris K. Iakovidis (University of Thessaly)

- **Proportional Myoelectric Control in a Virtual Reality Environment** (15m)

Iliana Loi (University of Patras), Panagiotis Tsinganos (University of Patras), Efe Bozkir (University of Tübingen), Dimitris Ampeliotis (Ionian University), Konstantinos Moustakas (University of Patras), Enkelejda Kasneci (University of Tübingen), Athanassios Skodras (University of Patras)

- **Sparse Analysis of Block-Boosted Deep Features for Osteoporosis Classification** (15m)

Chelsea Harris, Sokratis Makrogiannis (Delaware State University)

MON-AM: Coffee Break

🕒 Mon, Jun 27, 11:30 – 12:00

📍 Xenon/Napoli Di Romania

MON-AM2: Video Processing

Session Chair: Patrick Le Callet, Université de Nantes

🕒 Mon, Jun 27, 12:00 – 13:30

📍 Vouleftikon

- **Virtual validation of a multi-object tracker with intercamera tracking for automotive fisheye based surround view systems** (15m)

Guillem Delgado (Vicomtech), Mikel Garcia (Vicomtech), Marcos Nieto (Vicomtech), Jon Ander Íñiguez de Gordo (Vicomtech), Cristina Pérez (FICOSA), David Pujol (FICOSA), Aleksandar Jevtic (FICOSA)

- **Foveated MOVI-Codec: Foveation-based Deep Video Compression without Motion** (15m)

Meixu Chen (University of Texas at Austin), Richard Webb (Meta Reality Labs), Alan Bovik (University of Texas at Austin)

- **Explaining and Verifying the Robustness of Visual Object Trackers to Noise** (15m)

Iason Karakostas (Aristotle University of Thessaloniki), Vasileios Mygdalis (Aristotle University of Thessaloniki), Ioannis Pitas (Aristotle University of Thessaloniki)

- **Identifying Pitfalls in the Evaluation of Saliency Models for Videos** (15m)
Zhengyan Dong (Cardiff University), Xinbo Wu (Cardiff University), Xin Zhao (Cardiff University), Fan Zhang (University of Bristol), Hantao Liu (Cardiff University)
- **VIDI: A Video Dataset of Incidents** (15m)
Duygu Sesver (Istanbul Technical University), Alp Eren Gençoğlu (Istanbul Technical University), Çağrı Emre Yildiz (Istanbul Technical University), Zehra Günindi (Istanbul Technical University), Faeze Habibi (Istanbul Technical University), Ziya Ata Yazici (Istanbul Technical University), Hazim Kemal Ekenel (Istanbul Technical University)
- **Multimodal Video Summarization Based on Fuzzy Similarity Features** (15m)
Theodoros Psallidas (National Center for Scientific Research - "Demokritos"), Michael Vasilakakis (University of Thessaly), Evaggelos Spyrou (National Center for Scientific Research - "Demokritos"), Dimitris K. Iakovidis (University of Thessaly)

MON-PM1 (SS): Multimodal Analysis, Fusion, and Retrieval

Session Chair: Vasileios Sitokonstantinou, National Observatory of Athens

🕒 Mon, Jun 27, 15:30 – 17:00

📍 Vouleftikon

- **Sentinel-2 Images at 2.5m Spatial Resolution via Deep-Learning: A Case Study in Zakythnos** (15m)
Antigoni Panagiotopoulou (University of West Attica and National Center for Scientific Research - "Demokritos"), Emmanuel Bratsolis, Lazaros Grammatikopoulos (University of West Attica), Eleni Petsa (University of West Attica), Eleni Charou (National Center for Scientific Research - "Demokritos"), Konstantinos Poirazidis (Ionian University), Aristotelis Martinis (Ionian University), Nicholas Madamopoulos (Hellenic Air Force Academy)
- **A Data Cube of Big Satellite Image Time-Series for Agriculture Monitoring** (15m)
Vasileios Sitokonstantinou (National Observatory of Athens), Thanassis Drivas (National Observatory of Athens), Iason Tsardanidis (National

Observatory of Athens), Alkiviadis Koukos (National Observatory of Athens), Charalampos Kontoes (National Observatory of Athens), Vassilia Karathanassi (National Observatory of Athens)

- **SPARQL Querying for Validating the Usage of Automatically Georeferenced Social Media Data as Human Sensors for Air Quality** (15m)

Stelios Andreadis (Centre for Research and Technology Hellas - Information Technologies Institute), Mirette Elias (Fraunhofer IAIS and University of Bonn), Thanassis Mavropoulos (Centre for Research and Technology Hellas - Information Technologies Institute), Charis Papadopoulos (Centre for Research and Technology Hellas - Information Technologies Institute), Nick Pantelidis (Centre for Research and Technology Hellas - Information Technologies Institute), Ilias Gialampoukidis (Centre for Research and Technology Hellas - Information Technologies Institute), Stefanos Vrochidis (Centre for Research and Technology Hellas - Information Technologies Institute), Yiannis Kompatsiaris (Centre for Research and Technology Hellas - Information Technologies Institute)

- **Pest Presence Prediction Using Interpretable Machine Learning** (15m)

Ornela Nanushi (National Observatory of Athens), Vasileios Sitokonstantinou (National Observatory of Athens), Ilias Tsoumas (National Observatory of Athens), Charalampos Kontoes (National Observatory of Athens)

- **BiasHash: A Bayesian Hashing Framework for Image Retrieval** (15m)

Maria Pegia (Centre for Research and Technology Hellas - Information Technologies Institute), Anastasia Moutzidou (Centre for Research and Technology Hellas - Information Technologies Institute), Ilias Gialampoukidis (Centre for Research and Technology Hellas - Information Technologies Institute), Björn Jónsson (IT University of Copenhagen), Stefanos Vrochidis (Centre for Research and Technology Hellas - Information Technologies Institute), Yannis Kompatsiaris (Centre for Research and Technology Hellas - Information Technologies Institute)

- **Towards Space-to-Ground Data Availability for Agriculture Monitoring** (15m)

George Choumos (National Observatory of Athens), Alkiviadis Koukos (National Observatory of Athens), Vasileios Sitokonstantinou (National Observatory of Athens), Charalampos Kontoes (National Observatory of Athens)

MON-PM: Coffee Break

🕒 Mon, Jun 27, 17:00 – 17:30

📍 Xenon/Napoli Di Romania/3Sixty

MON-PM2: Image Analysis

Session Chair: Vince Calhoun, Tri-Institutional Center for Translational Research in Neuroimaging and Data Science, Georgia Tech

🕒 Mon, Jun 27, 17:30 – 19:00

📍 Vouleftikon

- **A Comparative Study of Compressive Sensing Algorithms for Hyperspectral Imaging Reconstruction** (15m)
Jon Alvarez Justo (Norwegian University of Science and Technology), Daniela Lupu (Norwegian University of Science and Technology), Milica Orlandic (Norwegian University of Science and Technology), Ion Necoara (Norwegian University of Science and Technology), Tor Arne Johansen (Norwegian University of Science and Technology)
- **LiDeR: Lightweight Dense Residual Network for Video Super-Resolution on Mobile Devices** (15m)
Ekrem Çetinkaya (Alpen-Adria-Universität Klagenfurt), Minh Nguyen (Alpen-Adria-Universität Klagenfurt), Christian Timmerer (Alpen-Adria-Universität Klagenfurt)
- **Non-Uniform Blind Image Deblurring Using an Algorithm Unrolling Neural Network** (15m)
Greig Richmond (Morgan State University), Arlene Cole-Rhodes (Morgan State University)
- **Gabor is Enough: Interpretable Deep Denoising with a Gabor Synthesis Dictionary Prior** (15m)
Nikola Janjusevic (New York University), Amirhossein Khalilian-Gourtani (New York University), Yao Wang (New York University)
- **Efficient Hyperspectral Reconstruction from RGB Images with Line-Pixel Deconvolution** (15m)
Pai Chet Ng (University of Toronto), Konstantinos Plataniotis (University of Toronto), Yannick Verdie (University of Toronto), Juwei Lu (Huawei Noah's Ark Lab)
- **Going from Lines to Triangles: A Formulation for Time-frequency Moments of Time-series With Application to Study fMRI** (15m)
Ashkan Faghiri Lewis (Tri-Institutional Center for Translational Research in Neuroimaging and Data Science), Armin Irajil Lewis (Tri-Institutional Center for Translational Research in Neuroimaging and Data Science), Noah Lewis (Tri-Institutional Center for Translational Research in Neuroimaging and Data Science)

Science), Kun Yang, Koko Ishizuka (Johns Hopkins University School of Medicine), Akira Sawa (Johns Hopkins University School of Medicine and Bloomberg School of Public Health), Tulay Adali (University of Maryland, Baltimore County), Vince Calhoun (Tri-Institutional Center for Translational Research in Neuroimaging and Data Science)

Tuesday June 28, 2022

TUE-AM1 (SS): Multispectral Sensing and Surveillance Applications

Session Chair: Panagiotis Karampelas, Hellenic Air Force Academy

🕒 Tue, Jun 28, 09:00 – 10:00

📍 Vouleftikon

- **Recognizing the Threats of Drone Surveillance. A Case Study** (15m)
Dimitrios Lappas (University of the Aegean), George Fessakis (University of the Aegean), Panagiotis Karampelas (Hellenic Air Force Academy)
- **Towards Using Thermal Cameras in Birth Detection** (15m)
Jorge García-Torres (University of Stavanger), Øyvind Meinich-Bache (University of Stavanger), Sara Brunne, Anders Johannessen (Laerdal Medical AS, Stavanger), Siren Rettedal (Stavanger University Hospital), Kjersti Engan (University of Stavanger)
- **Location-Aided Activity Recognition from Channel State Information with Deep Cross-Modal Learning** (15m)
Shervin Mehryar (University of Toronto)
- **SAR Image Classification with Knowledge Distillation and Class Balancing for Long-Tailed Distributions** (15m)
Chowdhury Sadman Jahan (Rochester Institute of Technology), Andreas Savakis (Rochester Institute of Technology), Erik Blasch (Air Force Office of Scientific Research)

TUE-AM2: Face, Gesture, Action, Emotion Recognition

Session Chairs: Andreas Savakis, Rochester Institute of Technology
Maria Tzelepi, Aristotle University of Thessaloniki

🕒 Tue, Jun 28, 10:00 – 11:30

📍 Vouleftikon

- **Gesture Recognition by Self-Supervised Moving Interest Point**

Completion for CNN-LSTMs (15m)

Fotini Patrona (Aristotle University of Thessaloniki), Ioannis Mademlis (Aristotle University of Thessaloniki), Ioannis Pitas (Aristotle University of Thessaloniki)

- **Monocular Weakly-Supervised Camera-Relative 3D Human Pose Estimation (15m)**

Anestis Christidis (Aristotle University of Thessaloniki), Christos Papaioannidis (Aristotle University of Thessaloniki), Ioannis Pitas (Aristotle University of Thessaloniki)

- **Context-Aware Memory Attention Network for Video-Based Action Recognition (15m)**

Thean Chun Koh (Nanyang Technological University), Chai Kiat Yeo (Nanyang Technological University), Vaitesswar U S (Nanyang Technological University), Xuan Jing (NEXT Product & Platform)

- **Audio-Video Fusion with Double Attention for Multimodal Emotion Recognition (15m)**

Bogdan Mocanu (University Politehnica of Bucharest), Ruxandra Tapu (Institute Mines-Telecom, Telecom SudParis / University Politehnica of Bucharest)

- **Cartoonized Anonymization of Sign Language Videos (15m)**

Christina Ourania Tze (National Technical University of Athens), Panagiotis Filntisis (National Technical University of Athens), Anastasios Roussos (Institute of Computer Science, Foundation for Research and Technology Hellas), Petros Maragos (National Technical University of Athens)

- **Attribute-based Gesture Recognition: Generalization to Unseen Classes (15m)**

George Retsinas (National Technical University of Athens), Panagiotis Filntisis (National Technical University of Athens), Nikolaos Kardaris (National Technical University of Athens), Petros Maragos (National Technical University of Athens)

TUE-AM: Coffee Break

🕒 Tue, Jun 28, 11:30 – 12:00

📍 Xenon/Napoli Di Romania

TUE-AM3: Applications

Session Chair: Yoram Bresler, University of Illinois at Urbana-Champaign

🕒 Tue, Jun 28, 12:00 – 13:30

📍 Vouleftikon

- **Dynamic Tomography Reconstruction by Projection-Domain Separable Modeling** (15m)
Berk Iskender (University of Illinois at Urbana-Champaign), Yoram Bresler (University of Illinois at Urbana-Champaign), Marc Louis Klasky (Los Alamos National Laboratory)
- **Multi-object Visual Tracking for Indoor Images of Retail Consumers** (15m)
Iason-Ioannis Panagos (University of Ioannina), Angelos Giotis (University of Ioannina), Christophoros Nikou (University of Ioannina)
- **Early Detection of DDoS Attacks Using Photonic Neural Networks** (15m)
Manos Kirtas (Aristotle University of Thessaloniki), Nikolaos Passalis (Aristotle University of Thessaloniki), Dimitrios Kalavrouziotis (Nvidia Mellanox Technologies Ltd.), Dimitrios Syrivelis (Nvidia Mellanox Technologies Ltd.), Paraskeuas Bakopoulos (Nvidia Mellanox Technologies Ltd.), Nikolaos Pleros (Aristotle University of Thessaloniki), Anastasios Tefas (Aristotle University of Thessaloniki)
- **Adversarial Deep Features for Weakly Supervised Document Image Keyword Spotting** (15m)
Angelos Giotis, (University of Ioannina), Giorgos Sfikas (University of West Attica), Christophoros Nikou (University of Ioannina)
- **Multi-scale Wavelet Frequency Channel Attention for Remote Sensing Image Segmentation** (15m)
Yu-Chen Su (National Taichung University of Science and Technology), Tsung-Jung Liu (National Taichung University of Science and Technology), Kuan-Hsien Liu (National Taichung University of Science and Technology)
- **A Framework to Map VMAF with the Probability of Just Noticeable Difference between Video Encoding Recipes** (15m)
Jingwen Zhu (Université de Nantes, France), Suiyi Ling (Université de Nantes, France), Patrick Le Callet (Université de Nantes, France)

TUE-PM1: Autonomous Vehicles

Session Chairs: Constantine Kotropoulos, Aristotle University of Thessaloniki
Christophoros Nikou, University of Ioannina

🕒 Tue, Jun 28, 15:30 – 17:00

📍 Vouleftikon

- **Parting With Illusions About Synthetic Data** (15m)
Daniel Pototzky (Robert Bosch GmbH, Universität Hildesheim), Azhar Sultan (Robert Bosch GmbH), Lars Schmidt-Thieme (Universität Hildesheim)
- **Does Self-Supervised Pretraining Really Match ImageNet Weights?** (15m)
Daniel Pototzky (Robert Bosch GmbH, Universität Hildesheim), Azhar Sultan (Robert Bosch GmbH), Lars Schmidt-Thieme (Universität Hildesheim)
- **On the Detection of Powerline Elements With Efficient Transformers** (15m)
Emmanouil Patsiouras (Aristotle University of Thessaloniki), Vasileios Mygdalis (Aristotle University of Thessaloniki), Ioannis Pitas (Aristotle University of Thessaloniki)
- **Drone Footage Wind Turbine Surface Damage Detection** (15m)
Ashley Foster (Plymouth University), Oscar Best (Plymouth University), Mario Gianni (Plymouth University), Asiya Khan (Plymouth University), Keri Collins (Plymouth University), Sanjay Sharma (Plymouth University)
- **Real-time Road Detection Implementation of UNet Architecture for Autonomous Driving** (15m)
Danut-Vasile Giurgi (Université de Haute Alsace), Thomas Josso-Laurain (Université de Haute Alsace), Maxime Devanne (Université de Haute Alsace), Jean-Philippe Lauffenburger (Université de Haute Alsace)
- **A Cooperative LiDAR-Camera Scheme for Extrinsic Calibration** (15m)
Georgios Zamanakos (Democritus University of Thrace), Lazaros Tsochatzidis (Democritus University of Thrace), Angelos Amanatiadis (Democritus University of Thrace), Ioannis Pratikakis (Democritus University of Thrace)

TUE-PM: Coffee Break

🕒 Tue, Jun 28, 17:00 – 17:30

📍 Xenon/Napoli Di Romania/3Sixty

Keynote 2: Avideh Zakhor

Session Chair: Thrasyvoulos Pappas, Northwestern University

🕒 Tue, Jun 28, 17:30 – 19:00

📍 Vouleftikon

Banquet

🕒 Tue, Jun 28, 20:00 – 22:00

📍 3Sixty

Wednesday June 29, 2022

Keynote 3: Ioannis Katsavounidis

Session Chair: Athanassios Skodras, University of Patras

🕒 Wed, Jun 29, 09:00 – 10:00

📍 Vouleftikon

WED AM1 (SS): Digital Pathology

Session Chairs: Kjersti Engan University of Stavanger

Valery Naranjo, Polytechnic University of Valencia

🕒 Wed, Jun 29, 10:00 – 11:30

📍 Vouleftikon

- **HUNIS: High-Performance Unsupervised Nuclei Instance Segmentation** (15m)
Vasileios Magoulianitis (University of Southern California), Yijing Yang (University of Southern California), C.-C. Jay Kuo (University of Southern California)
- **Multi-Resolution Framework For Spitzoid Neoplasm Classification Using Histological Data** (15m)
Rocío del Amor (Universitat Politècnica de València), Francisco Javier Curieses (Universitat Politècnica de València), Laëtítia Launet (Universitat Politècnica de València), Adrián Colomer (Universitat Politècnica de

València), Anaïs Moscardó (Hospital Clínico Universitario de Valencia), Andrés Mosquera-Zamudio (Hospital Clínico Universitario de Valencia), Carlos Monteagudo (Hospital Clínico Universitario de Valencia), Valery Naranjo (Universitat Politècnica de València)

- **Quantifying the Effect of Color Processing on Blood and Damaged Tissue Detection in Whole Slide Images (15m)**

Neel Kanwal (University of Stavanger), Saul Fuster (University of Stavanger), Farbod Khroaminia (Erasmus MC Cancer Institute, University Medical Center), Tahlita C.M. Zuiverloon (Erasmus MC Cancer Institute, University Medical Center), Chunming Rong University of Stavanger), Kjersti Engan (University of Stavanger)

- **Invasive Cancerous Area Detection in Non-Muscle Invasive Bladder Cancer Whole Slide Images (15m)**

Saul Fuster (University of Stavanger), Farbod Khroaminia (Erasmus MC Cancer Institute, University Medical Center), Umay Kiraz (Stavanger University Hospital), Neel Kanwal (University of Stavanger), Vebjørn Kvikstad (Stavanger University Hospital), Trygve Eftestøl (University of Stavanger), Tahlita C.M. Zuiverloon (Erasmus MC Cancer Institute, University Medical Center), Emiel A.M. Janssen (Stavanger University Hospital), Kjersti Engan (University of Stavanger)

- **Residual block Convolutional Auto Encoder in Content- Based Medical Image Retrieval (15m)**

Zahra Tabatabaei (Tyris Tech S.L.), Adrián Colomer (Universitat Politècnica de València), Kjersti Engan (University of Stavanger), Javier Oliver (Tyris Tech S.L.), Valery Naranjo (Universitat Politècnica de València)

- **Cascaded DNNs for Detecting the Position and Orientation of Left Ventricle from 3D CT Scans (15m)**

Magnus Caspersen (Technical University of Denmark), Md. Sayed Tanveer (Green University of Bangladesh), ASM Shihavuddin (Independent University, Bangladesh), M M Mahbul Syeed (Independent University, Bangladesh), Md. Hasan Maruf (Green University of Bangladesh), Ashraful Amin Uddin (Independent University, Bangladesh), Faisal M. Uddin (Independent University, Bangladesh)

WED AM: Coffee Break

🕒 Wed, Jun 29, 11:30 – 12:00

📍 Xenon/Napoli Di Romania

WED AM2: Machine Learning - Deep Learning

Session Chair: Konstantinos Plataniotis, University of Toronto

🕒 Wed, Jun 29, 12:00 – 13:30

📍 Vouleftikon

- **Electric Load Demand Forecasting on Greek Energy Market Using Lightweight Neural Networks** (15m)
Nikitas Maragkos (Aristotle University of Thessaloniki), Maria Tzelepi (Aristotle University of Thessaloniki), Nikolaos Passalis (Aristotle University of Thessaloniki), Apostolos Adamakos (Public Power Corporation), Anastasios Tefas (Aristotle University of Thessaloniki)
- **Subclass Knowledge Distillation with Known Subclass Labels** (15m)
Ahmad Sajedi (Centre for Management of Technology & Entrepreneurship, University of Toronto), Yuri Lawryshyn (Centre for Management of Technology & Entrepreneurship, University of Toronto), Konstantinos Plataniotis (University of Toronto)
- **Light-weight CNN-Based VVC Inter Partitioning Acceleration** (15m)
Yiqun Liu (ATEME/INRIA), Mohsen Abdoli (ATEME/INRIA), Thomas Guionnet (ATEME) Christine Guillemot (Institut National de Recherche en Sciences et Technologies du Numérique, INRIA), Aline Roumy (Institut National de Recherche en Sciences et Technologies du Numérique, INRIA)
- **Investigation of Deep Learning Architectures and Features for Adversarial Machine Learning Attacks in Modulation Classifications** (15m)
Marios Aristodemou (Loughborough University), Sangarapillai Lambotharan (Loughborough University), Gan Zheng (University of Cambridge), Leonidas Aristodemou (KU Leuven)
- **Multimodal Fusion of Brain Imaging Data with Joint Non-linear Independent Component Analysis** (15m)
Oktay Agcaoglu (Tri-institutional Center for Translational Research in Neuroimaging and Data Science), Rogers F. Silva (Tri-institutional Center for Translational Research in Neuroimaging and Data Science), Vince Calhoun (Tri-institutional Center for Translational Research in Neuroimaging and Data Science)
- **Federated Dictionary Learning from Non-IID Data** (15m)
Alexandros Gkillas (University of Patras), Dimitris Ampeliotis (Ionian University), Kostas Berberidis (University of Patras)

Tutorial

Introduction to Tropical Geometry and Its Applications to Machine Learning

Presented by Petros Maragos (National Technical University of Athens)

Sunday June 26, 12:00-13:30, Vouleftikon

Tropical geometry is a relatively recent field in mathematics and computer science combining elements of algebraic geometry and polyhedral geometry. It has recently emerged successfully in the analysis and extension of several classes of problems and systems in both classical machine learning and deep learning. In this tutorial we will first summarize introductory ideas and tools of tropical geometry and its underlying max-plus algebra. Then, we will focus on how this new set of tools can aid in the analysis, design and understanding of several classes of neural networks and other machine learning systems, including deep neural networks with piecewise-linear activations, morphological neural networks, neural network minimization, and nonlinear regression with piecewise-linear functions. Our coverage will include studying the representation power, training and pruning of these networks and regressors under the lens of tropical geometry and max-plus algebra. The expected background of the audience includes students, researchers, practitioners, and university faculty from the general areas of image/video & signal processing and machine learning.

References: P. Maragos, V. Charisopoulos and E. Theodosis, “Tropical Geometry and Machine Learning”, Proc. IEEE, May 2021:

<https://doi.org/10.1109/JPROC.2021.3065238>

More information and related papers can be found in <http://robotics.ntua.gr>.



Petros Maragos received the Diploma in E.E. from the National Technical University of Athens (NTUA) in 1980 and the M.Sc. and Ph.D. degrees from Georgia Tech, Atlanta, in 1982 and 1985. In 1985, he joined the faculty of the Division of Applied Sciences at Harvard University, where he worked for eight years as professor of electrical engineering affiliated with the Harvard Robotics Lab. In 1993, he joined the faculty of the School of ECE at Georgia Tech, affiliated with its Center for Signal and Image Processing. During 1996-98 he had a joint appointment as director of research at the Institute of Language and Speech

Processing in Athens. Since 1999, he has been working as professor at the NTUA School of ECE, where he is currently the director of the Intelligent Robotics and Automation Lab. He is also the coordinator of a Robotics Research Unit at the Athena Research & Innovation Center. He has held visiting positions at MIT in 2012 and at UPenn in 2016. His research and teaching interests include signal processing, machine learning, computer vision & speech, and robotics. He has served as: member of IEEE technical committees; associate editor for the IEEE Trans. on ASSP and Trans. on PAMI; co-organizer of several conferences and workshops on signal/image processing, computer vision, multimedia, robotics, and recently general chair of EUSIPCO-2017 and ICASSP-2023. He is the recipient or co-recipient of several awards for his

academic work, including a 1987-1992 National Science Foundation Presidential Young Investigator Award, a 1988 IEEE SPS Young Author Best Paper Award, a 1994 IEEE SPS Senior Best Paper Award, the 1995 IEEE Baker Prize Award, the 1996 Pattern Recognition Society's Honorable Mention Award, the CVPR-2011 Gesture Recognition Workshop's Best Paper Award, the EURASIP 2007 Technical Achievement Award, and the ECCVW-2020 Data Modeling Challenge Award. He was elected a Fellow of IEEE in 1995 and a Fellow of EURASIP in 2010 for his research contributions. He has served as IEEE SPS Distinguished Lecturer for 2017-2018.

Keynote 1

Deep Generative Models and Inverse Problems

Monday June 27, 09:00-10:00, Vouleftikon

Alex Dimakis, University of Texas at Austin

Linear inverse problems involve the reconstruction of an unknown vector (e.g., a tomography image) from an underdetermined system of noisy linear measurements. Most results in the literature require that the reconstructed signal has some known structure, e.g., it is sparse in some basis (usually Fourier or Wavelet). In this talk, we show how to remove such prior assumptions and rely instead on deep generative models (e.g., Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs)). We show how the problems of image inpainting (completing missing pixels) and super-resolution are special cases of our general framework. We generalize theoretical results on compressive sensing for deep generative models and discuss several open problems.



Alex Dimakis is a Professor at the Electrical and Computer Engineering department, University of Texas at Austin. From 2009 until 2012 he was with the Viterbi School of Engineering, University of Southern California. He received his Ph.D. in 2008 and M.S. degree in 2005 in electrical engineering and computer sciences from UC Berkeley and the Diploma degree from the National Technical University of Athens in 2003. During 2009 he was a CMI postdoctoral scholar at Caltech. He received an ARO young investigator award in 2014, the NSF Career award in 2011, a Google faculty research award in 2012 and the Eli Jury dissertation award in 2008. He is the co-recipient of several best paper awards including the joint Information Theory and Communications Society Best Paper Award in 2012. He served two terms as an associate editor for IEEE Signal Processing Letters and is currently serving as an associate editor for IEEE Transactions on Information Theory. His research interests include information theory, coding theory and machine learning.

Keynote 2

Applications of Multimodal Signal Processing to Combat Covid-19 Misinformation and Contact Tracing

Tuesday June 28, 17:30-19:00, Vouleftikon

Avideh Zakhor, University of California, Berkeley

In this talk, I will discuss two projects related to applications of multimodal signal processing to combat Covid 19. I begin with the problem of detecting misinformation in multimodal social media posts related to Covid-19. We collect one million Tweeter posts containing both video and text over a one year period, develop representation learning methods and contrastive learning and masked language modeling architectures for detecting inconsistencies between the two modalities, and characterize the performance of the proposed methods. Our best performing method outperforms state of the art methods by 9 to 14% in accuracy. Next, I will describe machine learning methods designed to detect proximity of users as it relates to exposure notification and contact tracing in the context of Covid 19 transmission. We estimate proximity of any two users in indoor environments by applying machine learning techniques to the temporal trace of the magnetometer and WiFi signal strength of their mobile devices to access points. We characterize the performance of both systems inside multiple buildings with heterogeneous set of mobile devices. We find the WiFi and magnetometer proximity detection to achieve balanced accuracies of up to 78% and 91% respectively.



Avideh Zakhor is currently Qualcomm Chair and professor in EECS at U.C. Berkeley. Her areas of interest include theories and applications of signal, image and video processing and 3D computer vision. She has won a number of best paper awards, including the IEEE Signal Processing Society in 1997 and 2009, IEEE Circuits and Systems Society in 1997 and 1999 and IEEE Solid Circuits Society in 2008. Prof. Zakhor received the B. S. degree from Caltech and the S. M. and Ph. D. degrees from MIT all in electrical engineering, in 1983, 1985, and 1987 respectively. She was a General Motors scholar from 1982 to 1983, was a Hertz fellow from 1984 to 1988, received the Presidential Young

Investigators (PYI) award from President George Herbert Walker Bush in 1990, and Office of Naval Research (ONR) young investigator award in 1992. In 2001, she was elected as IEEE fellow and in 2018 she was chosen as the Electronics Imaging Scientist of the year by Society of Photographic instrumentation Engineers (SPIE). She co-founded OPC technology in 1996, which was acquired later by Mentor Graphics (Nasdaq: MENT) in 1998, and UrbanScan Inc. in 2005, which was acquired by Google (Nasdaq:GOOGL) in 2007. She founded Indoor Reality in 2015 to develop technologies for rapid 3D mapping and visualization of buildings and assets.

Keynote 3

Energy Efficient Video Processing

Wednesday June 29, 09:00-10:00, Vouleftikon

Ioannis Katsavounidis, Meta

With the proliferation of social media, the volume of videos uploaded and shared on the Web has been continuously growing – and along with it the amount of energy needed to process, store and distribute them globally. Video coding standards have offered significant improvements in video quality, or equivalently, big reduction in bitrates while maintaining the same visual quality. Traditionally, such improvements in video coding carried equally significant, and as of late even more disproportionate so, increases in compute/energy requirements to deliver these savings. We will look into the problem of energy efficient video processing holistically and propose a few ways to address the growing demand in video processing through system-level optimization and by elevating energy efficiency to become a first-class citizen in future video coding standards.



Ioannis Katsavounidis is part of the Video Infrastructure team, leading technical efforts in improving video quality and quality of experience across all video products at Meta (formerly known as Facebook). Before joining Meta, he spent 3.5 years at Netflix, contributing to the development and popularization of VMAF, Netflix’s open-source video quality metrics, as well as inventing the Dynamic Optimizer, a shot-based perceptual video quality optimization framework that brought significant bitrate savings across the whole streaming spectrum. VMAF and the dynamic optimizer awarded Netflix two technical Emmys in 2020. He was a professor for 8 years at the University of Thessaly’s Electrical and Computer Engineering Department in Greece, teaching video compression, signal processing and information theory. He was one of the cofounders of Cidana, a mobile multimedia software company in Shanghai, China. He was the director of software for advanced video codecs at InterVideo, the makers of WinDVD, the most popular SW DVD player, in the early 2000’s and he has also spent 4 years working in high-energy experimental Physics in Italy. He is one of the co-chairs for the statistical analysis methods (SAM) and no-reference metrics (NORM) groups at the Video Quality Experts Group (VQEG). He is actively involved within the Alliance for Open Media (AOM) as co-chair of the software implementation working group (SWIG). He has over 150 publications, including 50 patents. His research interests lie in video coding, quality of experience, adaptive streaming, and energy efficient HW/SW multimedia processing.

General Information

Registration Hours

The IVMSP 2022 Registration desk is located at the entrance of Vouleftikon. Hours of operation are:

Sunday June 26... 09:00-12:00

Tuesday June 28... 08:00-09:00

Monday June 27... 08:00-09:00

Wednesday June 29... 08:00-09:00

Venue

Vouleftikon

Staikopoulou 12

Nafplio 211 00

Phone: +30 752 027096

Map: <https://goo.gl/maps/7dyMi3SZpMVouDFr9>

Internet Access

Free WiFi access is available to all attendees in the venue. Connect to network “**IVMSP22**” and use the password “**IEEE2022**” to join the network.

Social Events

Opening Ceremony

Sunday, 26 June 19:00-20:00, Vouleftikon

The formal Opening of IVMSP 2022 will take place in Vouleftikon on Sunday, June, the 26th at 7pm by the General Chairs, Professor Constantine Kotropoulos and Professor Christophoros Nikou. A heartily welcome to the historical city of Nafplio will be addressed by Mr. Demetrios Kostouros, the Mayor of Nafplio.

Welcome Reception

Sunday, 26 June 20:15, Napoli Di Romania

Free, for registered participants.

The Organizing Committee would like to welcome you to Nafplio and IVMSP 2022. Please join us Sunday June 26 for drinks, local bread and cheese varieties, and cold meat platter.

Banquet

Tuesday, 28 June 20:00-22:00, 3Sixty

Not included in registration fee – limited space.

Cost of tickets for registered participants or guests: € 80

Recommended Restaurants at Nafplio

***Courtesy of the Department of Performing and Digital Arts at
the University of Peloponnese***

Aiolos Tavern

Vasilissis Olgas 30
Phone 2752 026828
Price: mains €8-15

I Gonia tou Kavallari

cnr Amalias & Koletti
Phone: 2752 500180
Price: meze €4-9

Menta

25 Martiou 7-19
Phone: 27520 23603
Price: dishes €8-15

Kakanarakis 1896

Vasilissis Olgas 18
Phone: 27520 25371
Price: mains €8-15

Kipos Restaurant

Filellinon sq 1
Phone: 27520 22978
kiposnafplio.gr
Price: mains €9-23

Noulis Mezedes Tavern

Moutzouridou 22
Phone: 2752 025541
<http://www.noulis-meze.gr/>

Pidalio

25 Martiou 5
Phone : 27520 22603
www.pidalio.gr
Price: mains €7-10

Karamalis

cnr Bouboulinas & Syggrou
Phone: 27520 97999
Price: mains €6-15

3sixty

cnr Papanikolaou 26 & Koletti
Phone: 27520 28068
www.3sixty.life
Price: mains €13-52

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