ICPR-2022
8th International Workshop
"Image Mining. Theory and Applications"
IMTA-VIII-2022
August 21, 2022 | Online
http://imta.isti.cnr.it/

Organized in conjunction with the 26th International Conference on Pattern Recognition (ICPR 2022), Montreal, Quebec, Canada, August 21-25, 2022
*(*https://www.icpr2022.com *)*

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The IMTA-VIII-2022 will be conducted by the Technical Committee No. 16 "Algebraic and Discrete Mathematical Techniques in Pattern Recognition and Image Analysis" of the International Association for Pattern Recognition and by the National Committee for Pattern Recognition and Image Analysis of the Russian Academy of Sciences.

The main purpose of the IMTA-VIII-2022 is to provide the fusion of modern mathematical approaches and techniques for image analysis/pattern recognition with the requests of applications.

The goals of IMTA-VIII-2022 are:
(i) to unite the Algebraic, Discrete Mathematics and otherwise mathematically inspired scientists, engineers, researchers, IT-people involved in Image Analysis, Pattern Recognition and Artificial

Intelligence for providing them new opportunities to know and understand each other better and to communicate on a regular basis;

(ii) to provide an event for discussing actual and prospective lines of research and to exchange recent advances in Algebraic, Discrete Mathematics and other Mathematical Problems and Techniques inspired by Image Analysis and Pattern Recognition.

The IMTA-VIII-2022 will continue the successful series of workshops devoted to new and modern mathematical techniques of image mining and to corresponding applications:

• IMTA-I-2008, Funchal, Madeira, Portugal, in conjunction with the 3rd International Conference on Computer Vision Theory and Applications (VISAPP 2008);

• IMTA-II-2009, Lisboa, Portugal, in conjunction with the 4th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISIGRAPP 2009);

• IMTA-III-2010, Angers, France, in conjunction with the 5th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISIGRAPP 2010);

• IMTA-IV-2013, Barcelona, Spain, in conjunction with the 8th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISIGRAPP 2013);

• IMTA-V-2015, Berlin, Germany, in conjunction with the 10th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISIGRAPP 2015);

• IMTA-VI-2018, Montreal, Canada, in conjunction with the 1st International Conference on Pattern Recognition and Artificial Intelligence (ICPRAI 2018);

• IMTA-VII-2021, Milano-Italy, in conjunction with the 25th International Conference on Pattern Recognition (ICPR 2020).

The workshop will consist of invited talks, contributed talks, posters and informal discussions.

Scope

Automation of image mining is one of the most important strategic goals in image analysis, recognition and understanding both in scientific and technological aspects. The main subgoals are developing and applying of mathematical theory for constructing image models and representations allowable by efficient pattern recognition algorithms and for constructing standardized representations and selection of image analysis transforms. Automation of image mining is possible by combined application of mathematical theory of image analysis/understanding/recognition and mathematical theory of pattern recognition.

Automation of image processing, analysis, estimating and understanding is one of the crucial points of theoretical computer science having decisive importance for applications, in particular, for diversification of solvable problem types and for increasing the efficiency of problem solving.

The role of an image as an analysis and estimation object is defined by its specific and inalienable informational properties. Image is a mixture and a combination of initial (raw, "real") data and its representation means of computational procedures and of the physical nature and of the models of objects, events and processes being represented via an image.

The specificity, complexity and difficulties of image analysis and estimation (IAE) problems stem from necessity to achieve some balance between such highly contradictory factors as goals and tasks of a problem solving, the nature of visual perception, ways and means of an image acquisition, formation, representation, reproduction and rendering, and mathematical, computational and technological means allowable for the IAE.

The mathematical theory of image analysis is not finished and is passing through a developing stage. It cleared not so long ago that only intensive creating a comprehensive mathematical theory of image analysis and recognition (in addition to the mathematical theory of pattern recognition) could bring a real opportunity to solve efficiently application problems via extracting from images the information necessary for intelligent decision-making. The transition to practical, reliable and efficient automation of image mining is directly dependent on introducing and developing mathematical means for IAE.

The participants will enjoy the opportunity to discuss a methodology, mathematical and computational techniques for automation of image mining on the base of mathematical theory for IAE. Another important task of the workshop is to discuss artificial intelligence techniques, in particular, linguistic and knowledge engineering tools for image mining – image knowledge bases and image science ontologies – and to estimate the prospects of the algebraic approaches in representation of image analysis knowledge in this environment. The interpretation of mathematical and linguistic techniques will be illustrated by application problems, mainly from biology and medicine, automation of scientific research, industrial applications and of many other domains generating breakthrough and difficult application tasks.

Topics
This workshop is intended to cover, but it is not limited to, the following topics:

A. Methodological Advances in Image Analysis and Pattern Recognition with a Special Focus on:
A.1 Algebra
A.2 Discrete mathematics
A.3 Computational Topology
A.4 Machine Learning

B. New Mathematical Techniques in Image Mining
B.1 Algebraic Approaches
B.2 Image Algebras, Descriptive Image Algebras and Lattice Algebras
B.3 Lattice-based Deep Hierarchical Representations and Neural Networks
B.4 Discrete Mathematics Techniques
B.5 Descriptive Image Analysis
B.6. Ill-Structured Data Representation and Processing Problems
B.7 Structural and Syntactic Techniques
B.8 Multiple Classifiers and Fusion of Algorithms
B.9 Pattern Recognition Techniques in Image-Mining Environment
B.9 Other Mathematical Techniques

C. Image Models, Representations and Features
C.1 Feature Detectors
C.2 Features from Autoencoder Networks
C.3 Formalized Image Models
C.4 Spatial Data Representations (Combinatorial Structures of Local Neighborhood)
C.5 Dual Image Representations

D. Automation of Image and Data Mining
D.1 Image and Ill-Structured Data Analysis
D.2 Image Mining, Computer Vision and Knowledge-Based Systems
D.3 Image Databases
D.4 Image Mining Technologies

E. Artificial Intelligence Techniques in Image Mining
E.1 Knowledge Representation, Processing, Extracting and Analysis
E.2 Image Knowledge Bases
E.3 Linguistic Tools for Image Mining (Image Science Ontologies; Image Science Thesauri)

F. Applied Problems for Image Mining
F.1 Bioinformatics
F.2 Bioengineering
F.3 Medical applications
F.4 Industry and Economics
F.5 Cultural Heritage
F.6 Other Important, Difficult and Interesting Applied Problems

Intended audience
Professionals, researchers and engineers, PhD students and graduate students interested in Mathematical Theory of Image Analysis, in Problem-Solving via modern mathematical techniques, in intellectual decision-making, designers of automated image analysis systems.

Important Dates
Submission deadline**: May 24, 2022**
Author notification: **May 31, 2022**
Final submission of accepted papers for publication*: **June 5, 2022**
Publication**:** "Pattern Recognition and Image Analysis. Advances in Mathematical Theory and Applications", 2022, Vol.32, No.3, Special Issue "Proceedings of IMTA-VIII-2022"

* The texts of the papers will be published as they were submitted for review. So we draw the authors' attention to the fact that all papers submitted in the period up to May 24 should be prepared strictly in accordance with Author Guidelines. If absolutely necessary, the authors could, after receiving the notification of acceptance of the paper for publication, make the minimum necessary changes to the text and submit the paper by June 5, however, this is highly undesirable.

The deadlines are fixed and will not be extended.

Paper Submission
We invite submissions of papers describing work in the domains suggested above or in closely related areas.
The paper should be submitted in English via EasyChair:
https://easychair.org/conferences/?conf=imtaviii2022.
The submitted paper should be at least 3 pages (page format - 1 column; font - Times New Roman, font size - 12, 30 lines, 60 characters per line (with spaces), 2 intervals). Maximum size of paper is not limited but should be reasonable. The recommended length is from 3 to 10.
Accepted submissions will be presented either as oral or posters at the workshop.

Paper Templates
Guidelines to the manuscript submission are attached to this call-for-papers (the files "Instructions for authors" and "Enclosure 1. Manuscript Metadata and Structure Template.docx").

Ethical Requirements
By submitting to IMTA-VIII-2022, the authors acknowledge that the submitted paper has not previously and is not currently accepted for publication in its current form. This includes, but is not limited to, any conference, workshop, journal or collection of papers.
The paper will be presented in person by its author(s).
IMTA-VIII-2022 may remove any papers violating these requirements.

Paper Reviewing Process
All papers will be peer-reviewed. The criteria for accepting the papers will be as follows:
° the paper is focused on the IMTA-VIII-2022 topics and presents new methods in image mining;
° the paper increases the impact of image mining methods in applications, e.g. providing new technique for an old application problem, or a new application for a known technique;
° the paper increases the awareness and comprehension about the image mining theory providing novel research perspectives possibly merging with other domains.

The papers should be prepared strictly in accordance with files "Instructions for authors" and "Enclosure 1. Manuscript Metadata and Structure Template.docx". The papers that are not 100% corresponded to the Author Guidelines will not be reviewed until the authors would not update them to the requirements of the Author Guidelines.

Workshop Proceedings
Proceedings will be published in a Special Issue "Proceedings of IMTA-VIII-2022" of the International Journal of the Russian Academy of Sciences "Pattern Recognition and Image Analysis. Advances in Mathematical Theory and Applications" (PRIA, Vol. 32, No. 3, 2022) (the Publisher - Pleiades Publishing, Ltd.: Tropic Isle Building, P.O. Box 3331, Road Town, Tortola, British Virgin Islands; c/o Springer Science + Business Media LLC, 223 Spring St., 6th Floor, New York, NY, 10013, USA; Pleiades House7 West 54 Street, New York, NY 10019) ISSN PRINT: 1054-6618, ISSN ONLINE: 1555-6212).
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Advanced Technologies & Aerospace Database, ProQuest Business Premium Collection, ProQuest Central, ProQuest Computer and Information Systems Abstracts, ProQuest Computing Database, ProQuest Materials Science & Engineering Database, ProQuest Science Database, ProQuest SciTech Premium Collection, ProQuest Technology Collection, ProQuest-ExLibris Primo, ProQuest-ExLibris Summon, Russian Science Citation Index on the Web of Science Platform.
Each paper in PRIA has DOI.
See PRIA – http://pleiades.online and http://link.springer.com

After ICPR 2022, the extended texts of the papers presented at the IMTA-VIII-2022, selected and recommended by IMTA Committee, will be published by Springer in the Lecture Notes in Computer Science (LNCS) series. The corresponded notification will be sent to the authors in appropriate time.

Registration Information
No registration fee is required for the publication of papers in the journal PRIA.
The publication in the Special Issue "Proceedings of IMTA-VIII-2022" of the PRIA Journal is not connected in any way with the registration of potential authors in ICPR 2022.
The registration information concerning the participation in IMTA-VIII-2022 and/or ICPR 2022 is at the ICPR 2022 website.
https://www.icpr2022.com/registration/

Workshop Contact
All questions and requests for additional information should be sent to imta@isti.cnr.it.

Attention:

*** The workshop will be fully virtual ***