IAPR-TC18 - Discrete Geometry and Mathematical Morphology Interim Report Period September 2022 - August 2023

Sara Brunetti (Chair) and Benjemin Perret (Vice Chair) with Phuc Ngo (TC18 Secretary) and TC18 Board

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1 Activities during the reference period

1.1 Members evolution

The number of members is actually of 172 (+11 compared to 2021).

1.2 Conferences organization

Following the aim of this IAPR-Technical Committee to promote interactions and collaborations between researchers working on Discrete Geometry and Mathematical Morphology, the second edition of the conference on Discrete Geometry and Mathematical Morphology (DGMM) was held in Strasbourg (France) on October 24-27, 2022: https://iapr.org/archives/dgmm2022/.

1.3 Special Issues and Proceedings

Special issues were proposed in conjunction to DGMM 2021 and 2022, and TAIR 2022. Proceedings of RRPR were finalized.

- DGMM 2021 special issue: JMIV (v. 64-7) was published in September 2022. Selected papers were invited to extend their DGMM papers. Filip Malmberg, Joakim Lindblad, Natasa Sladoje: Guest Editorial: Discrete Geometry and Mathematical Morphology. J. Math. Imaging Vis. 64(7): 691-692 (2022) https://link.springer.com/journal/10851/volumes-and-issues/64-7?utm_source=toc&utm_medium=email&utm_campaign=toc_10851_64_7&utm_content=etoc_springer_20220902
- Proceedings of RRPR 2023: Bertrand Kerautret, Miguel Colom, Adrien Krähenbühl, Daniel Lopresti, Pascal Monasse, et al.. Reproducible Research in Pattern Recognition: Fourth International Workshop, RRPR 2022. 14068, Springer International Publishing, 2023, Lecture Notes in Computer Science, (10.1007/978-3-030-76423-4) were published on July 5, 2023: https://link.springer.com/book/10.1007/978-3-031-40773-4
- The special issue of selected invited papers of DGMM 2022 on JMIV will be published soon
- TAIR 2022 special issue: Fundamenta Informaticae was published in August 2022. Paolo Dulio, Andrea Frosini, Grzegorz Rozenberg, Lama Tarsissi: Guest Editorial: Tomography and Applications 2022, Fundamenta Informaticae 189 - 2 DOI 10.3233/FI-222153 https://fi.episciences. org/volume/view/id/739

1.4 Tutorial organization

Tutorials on DGtal -Digital Geometry Tools and Algorithms Library- (https://https://dgtal.org/) and Higra -Hierarchical Graph Analysis- (https://www.sciencedirect.com/science/article/pii/S235271101930247X) were hosted by DGMM 2022: two tutorial sessions on DGtal, library on Discrete Geometry, done by David Coeurjolly, and Higra, library on Mathematical Morphology, done by Benjamin Perret.

1.5 New Code Release

After about 10 years of developments, the Dgtal Team was very proud to announce the DGtal 1.0 release. 26 developers have contributed to DGtal and its tools (see https://dgtal.org). Link to this major version:

- DGtal 1.0: https://github.com/DGtal-team/DGtal/releases/tag/1.0
- DGtalTools 1.0: https://github.com/DGtal-team/DGtalTools/releases/tag/1.0
- The last DGtal 1.3 was released on November 25, 2022: https://dgtal.org/2022-11-25-dgtal-release1. 3/

1.6 Awards

In order to promote the work of young researchers, DGMM 2022 awarded the best student paper. The best student paper award, sponsored by the IAPR, was won by Josselin Lefèvre et al. for the contribution entitled "Join, Select, and Insert: Efficient Out-of-core Algorithms for Hierarchical Segmentation Trees". The interview to him is included in the IAPR-Newsletter Volume 45, Number 2 April 2023.

2 Reports on Main Past Events

2.1 DGMM2022

The second edition of the conference on Discrete Geometry and Mathematical Morphology (DGMM) was held in Strasbourg (France) on October 24-27, 2022: https://iapr.org/archives/dgmm2022.

The event was really successful comprising 33 high quality accepted contributions highlighting the current trends and advances in discrete geometry and mathematical morphology, ranging from purely theoretical contributions, algorithmic developments, or novel applications in image processing, computer vision, and pattern recognition. Three keynote speeches were given:

- Isabelle Bloch (Sorbonne Université, France) on Hybrid AI for knowledge representation and modelbased medical image understanding - Towards explainability;
- Christer Kiselman (Uppsala University, Sweden) on Digital geometry, mathematical morphology, and discrete optimization;
- Nicolas Courty (University Bretagne Sud, France) on Sliced Wasserstein on Manifolds: Spherical and Hyperbolical cases.

The best student paper award, sponsored by the IAPR, was won by Josselin Lefévre et al. for the contribution entitled "Join, Select, and Insert: Efficient Out-of-core Algorithms for Hierarchical Segmentation Trees". The jury has also decerned a special mention to Jui-Ting Lu for the paper "A new lattice-based plane-probing algorithm".

The proceedings appeared in Springer's LNCS series (number 13493, DOI: 10.1007/978-3-031-19897-7), and a special issue with extended versions of selected outstanding contributions will be published on the Journal of Mathematical Imaging and Vision.

2.2 RRPR2022

The fourth edition of the Reproducible Research in Pattern Recognition (RRPR) workshop was held in Montreal, Canada on August 21st during ICPR 2022. The event was extended beyond the workshop in two ways: First, RRPR continued with a new open poster presentation track at the second edition of the IAPR international conference Discrete Geometry and Mathematical Morphology (DGMM) held two months after RRPR in Strasbourg on 24-27 Oct 2022. Second, two focus groups were formed with the goal of discussing the efforts to integrate reproducible research in international conferences, motivating reproducible research, and measuring the balance between impact versus investment. Finally, after the post-proceedings process 5 full papers and 4 short companion papers were accepted. Proceedings of RRPR 2023 appeared in Springer's LNCS series: Bertrand Kerautret, Miguel Colom, Adrien Krähenbühl, Daniel Lopresti, Pascal Monasse, et al.. Reproducible Research in Pattern Recognition: Fourth International Workshop, RRPR 2022. 14068, Springer International Publishing, 2023, Lecture Notes in Computer Science, $\langle 10.1007/978-3-030-76423-4 \rangle$ were published on July 5, 2023: https://link.springer.com/book/10.1007/978-3-031-40773-4

2.3 Other Events

• TAIR2022: The Meeting on Tomography and Applications: Discrete Tomography, Neuroscience and Image Reconstruction (TAIR) - was held in Milan on May 15-17, 2023 https://www.mate.polimi.it/events/TAIR2023/

Around 40 participants, distributed on the three days, attended the different sections of the meeting. The program consisted of 5 plenary lectures and 8 short talks, touching on different aspects of tomographic reconstruction, as well as on neuroscience topics.

• Journées du Groupe de Travail en Géométrie Discrète et Morphologie Mathématique was held in Caen (France) on 6-7 July 2023: https://gdmm2023.sciencesconf.org/

3 Plans for activities in the next year of Summer Schools, Workshops, Conferences sponsored/endorsed by IAPR

The third edition of the conference on Discrete Geometry and Mathematical Morphology (DGMM) will be held in Florence (Italy), 15-18 April 2024: https://iapr.org/dgmm2024

Tutorial on Discrete Geometry and Mathematical Morphology: DGMM 2024 will host two tutorial sessions, one in the morning constituted by three seminars (two on DG and one on MM); in the afternoon three seminars on topics related to applications.