

# IAPR-TC18 - Discrete Geometry and Mathematical Morphology

## Interim Report

### Period January-July 2017

Bertrand Kerautret and Michael Wilkinson

August, 2017

## 1 Activities in the last six months

### 1.1 New axis of Mathematical Morphology

From the previous IAPR TC meeting given at ICPR 2016, the TC18 includes now the Mathematical Morphology and Michael Wilkinson represents MM as co chair.

During the previous International Symposium on Mathematical Morphology last May 15 - 17, Mickael introduces the new combined TC and the response was very positive. The members from ISMM mailing list will be invited to become members of TC18. For this purpose a new refresh of the previous mailing list was needed. (see Section 1.4).

### 1.2 New Board including Mathematical Morphology

The TC18 leadership board is composed of the main chairs:

- Bertrand Kerautret (Associate Professor, LORIA, University of Lorraine, France): chair in charge of the relationship with DGCI and of the membership with the mailing list management.
- Mickael Wilkinson (Senior Lecturer, Institute for Mathematics and Computing Science, University of Groningen, The Netherlands): co chair in charge of the relationship with ISMM.

and the board members:

- Arindam Biswas, Indian Institute of Engineering Science & Technology, Shibpur, India.
- Andrea Frosini, Dept. Matematica and Informatica "Ulisse Dini", Firenze, Italia.
- Georgios K Ouzounis, DigitalGlobe, Inc. Longmont, CO 80503, USA.
- Hugues Talbot, Laboratoire d'informatique Gaspard Monge, ESIEE, France.

This board members is in charge of the newsletter, the website, data and code repositories, or industrial relations. Arindam and Andrea participate mainly to this charge with a link to the Discrete Geometry and Georgios and Hugues contributes more with the link to Mathematical Morphology.

### 1.3 Members evolution

The number of members is actually of 107 (+12 compared to 2016). This number should be significantly increased with the merge of the MM potential members. As previously mentioned, the response of MM was very positive that constitutes some new perspectives to the dynamism of this TC.

### 1.4 New Organization of the mailing list with newsletter and site update

The previous mailing list (in particular for the members `members@tc18.org`) was a simple alias with a mail redirection pointing to all members emails. Such a solution was not convenient to filter non appropriate emails (from some members the number of spam was very important). Now the actual address `members@tc18.org` is still working but is redirected to the new `tc18.members@inria.fr`. This new mailing list is now handled by the *Sympa* mailing list server and is moderated with mail archives. We have transferred all member emails from the previous alias and the system is ready to host new ISMM members.

The site started to be updated including MM main event and the first newsletter with MM was sent in August 2017 (<http://www.tc18.org/newsletters/newsletterAugust2017.html>).

## 2 Reports on main past and forthcoming events

The actual interim report is exactly between the two main events of this TC: ISMM and DGCI 2017. We describe here a first report of the ISMM event together with information and organization of the forthcoming event.

### 2.1 ISMM short report

From the previous TC18 letters, the 13th International Symposium on Mathematical Morphology held in Fontainebleau France, during May 15-17, 2017 (on the campus of MINES ParisTech). This symposium can be considered as the main scientific event in the field of Mathematical Morphology. They received around 53 high-quality papers which were reviewed by at least three reviewers. From the reviewing results 16 papers were accepted as poster presentation and 24 as oral presentation. The authors come from 15 different countries: Australia, Austria, Brazil, France, Germany, Greece, India, Japan, The Netherlands, Poland, Serbia, Sweden, Turkey, USA, and UK. Three keynote speakers were invited:

- Pierre Vanderghenst: Signal Processing on Graphs.
- Dan Ciresan: Deep Neural Networks for Biomedical Image Analysis.
- Stephane Gaubert: Tropical and non-linear Perron-Frobenius methods for optimal control and zero-sum games.

And a talk was given by Jean Serra for the 50 years of the CMM.

The ISMM steering committee has decided to hold the 2019 ISMM in Germany and more details will be given in the next TC18 letter.

### 2.2 DGCI forthcoming event

The 20th edition of DGCI will be given in few weeks at Vienna Austria and is organized by the Pattern Recognition and Image Processing Group (PRIP) of TU Wien. The program is available online:

[http://dgci2017.prip.tuwien.ac.at/preliminary\\_program\\_DGCI2017.pdf](http://dgci2017.prip.tuwien.ac.at/preliminary_program_DGCI2017.pdf)

It contains 18 oral and 10 posters presentations and three invited speakers:

- Eric Andres with a talk on the digital swept tubes.
- Helmut Pottmann will speak about the freeform architecture and discrete differential geometry.
- Michael Wilkinson will introduce a guided tour of connective morphology: concepts, algorithms, and applications.

Abstracts of these talks are available at the DGCi web site:

<http://dgci2017.prip.tuwien.ac.at/speakers.html>

As initiated by the previous TC18 team, the session on open problems will be presented at DGCi together with the TC18 session. (scheduled at 15:00 Wednesday, September 20, 2017).

### 2.3 Other event

The 18th international **Workshop on Combinatorial Image Analysis** (IWCIA 17) held in Plovdiv in Bulgaria, June 19-21, 2017. Five keynotes were given. The first one was a talk of Alfred Bruckstein on the *Probabilistic Ant Pursuits and Grid Geometry*. The second one was given by Marc van Kreveld with a presentation on *Onto the Grid and Off the Grid: on Measures and Picture Puzzles*. Then a talk on *Quantum Graphs, the Edge-based Laplacian and Shape* was given by Edwin Hancock followed by a talk of Christian Ronse on the *Orders on Partial Partitions for Image Segmentation, Filtering and Reduction*. And finally, Günter Rote presents a talk on *Congruence Testing in 4-Space*.

Other 27 presentations were given on the main topics of Digital Geometry and Topology, Computational and Combinatorial Geometry, Theory and Applications and Picture Grammars. A poster session on ongoing research projects and original works in progress were also proposed but not included in the conference proceedings.

A special issue on *Digital Manifolds in Computer Modeling* is associated to this event:

<https://www.journals.elsevier.com/information-sciences/call-for-papers/special-issue-on-digital-manifolds-in-computer-modeling>

## 3 Plans until ICPR2018 and beyond

The new axis of MM is the occasion to open new opportunities to propose new activities. Actually some planes are considered which are proposed here but others ideas could emerge after the DGCi meeting.

### 3.1 Update TC18 website with code/data set related to Mathematical Morphology

The code and data section of the actual web site has to be completed with the specific parts of Mathematical Morphology. Actually, it contains mainly projects related to discrete geometry but more contents with MM can be added in the future. Moreover the website will be updated including open problems oriented to MM.

### 3.2 New edition of previous RRPR workshop

Following the first successful edition of the IAPR RRPR workshop, we plane to propose a second new edition of this workshop always in association to ICPR in order to promote Reproducible Research in Pattern Recognition. A special focus on Discrete Geometry and Mathematical Morphology is also an interesting option to highlight ICPR papers from the TC18 axis.

To add more impact to this workshop, we plane to anticipate contacts with ICPR chairs to orient the authors to this call for paper with the special TC18 focus. By this way, the ICPR authors

will have the opportunity to submit their companion papers with a focus on the reproduction results.

### **3.3 Special issue of IPOL on Discrete Geometry and Mathematical Morphology in link to RRPR**

From the previous IPOL special issue on DGCi (published in 2014), we plane to organize a similar special issue by including results of previous ISMM and DGCi papers with the addition of a selection of last RRPR papers.

Such a new initiative will be facilitated by the new *IPOL Editor's Control Panel* which allows to construct online demonstrations by using a simple description without using a specific program/language. A demonstration of this system will be presented during the TC18 session of DGCi 2017.

### **3.4 Workshop and tutorials oriented to Discrete Geometry and Mathematical Morphology**

We also plane to follow some similar initiatives like the previous ACCV workshop on Discrete Geometry and Mathematical Morphology proposed by Akihiro Sugimoto, Yukiko Kenmochi and Jean Cousty or the tutorials given on MM and DG <sup>1</sup>. Such events are important to present the results of the main TC18 field to other topic like computer-vision community. We are also planning to develop special sessions and tutorials on Mathematical Morphology and its applications to big data in astronomy, as spin-off of the EU SUNDIAL project.

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<sup>1</sup>see. <http://www.accv2016.org/workshops-and-tutorials/>