

International Association for Pattern Recognition

TC 3 Neural Networks and Computational Intelligence

Report to the
Executive Committee and Governing Board

September 2014- December 2016

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1. TC3 Background

Chair:

Neamat El Gayar neamat@encs.concordia.ca
Cairo University, Egypt

Vice-Chair

Edmondo Trentin trentin@dii.unisi.it
University of Siena, Italy

1.1. Leadership Board

Amir Atiya
Friedhelm Schwenker
Simone Marinai

Information Officer:
Andreas Fischer

Newsletter and Website Editor:
Nicola Nobile

1.2. TC3 website

www.icpr-tc3.org

1.3. Number of members

254 researches are members of the TC3 mailing list.

1.4. Communication types used

Newsletters and conference information (approx. 10-15 per year)

1.5. Key event organised by the TC3

The Workshop on Artificial Neural Networks for Pattern Recognition (ANNPR) is the major event of TC3.

2. Activities in the last years

2.1 Workshops, Events, Meetings & Publications:

2.1.1 ANNPR 2014

- The 6th TC3 IAPR Workshop on Artificial Neural Networks for Pattern Recognition (ANNPR 2014) was held in October 6-8 2014 in Montreal, Canada. The proceeding was published in the Springer Lecture Notes on Artificial Intelligence No 8774. The workshop was organized by Prof. Ching Suen (Concordia University, Canada), Dr. Neamat El Gayar (Cairo/Concordia University) and Dr. Friedhelm Schwenker (Ulm University, Germany). In ANNPR 2016, a total of 24 high-quality papers presented original research on neural networks, machine learning and pattern recognition focusing on both theoretical and applied aspects. Participants from different part of the world (Europe, Asia, North America and Africa) attended the workshop. During three days, the attendees presented their work organized in multiple focused sessions on Learning and Architectures, Ensembles, Support Vector Machines, Character Recognition and Image Processing. Additionally three enriching invited talks were given by Prof. Zhi-Hua Zhou (Nanjing University, China), Prof. Dr. Yoshua Bengio (University of Montreal, Canada) and Dr. J. Michael Herrmann (University of Edinburgh, UK). www.annpr2014.com
- A report on [ANNPR](#) 2014 was published in the IAPR 2015 April's [newsletter](#).

2.1.2 Leadership Board Meeting 2014

- The leadership board met in October 2014 during the ANNPR 2014 workshop and identified the following research field as a main focus for TC3 in the next years:
 - Deep Learning
 - Recurrent Networks

- Large scale learning and Big data challenges
- Biologically inspired robot learning

Relevant educational material including tutorials, demos and interesting applications have been collected and included in the TC3 website.

2.1.3. TC3 Event Endorsements

- TC3 has helped to promote following events:
 - MCS2015, 12th International Conference on Multiple Classifier Systems, Reisenburg Castle (Günzburg, Germany), Ulm University, June 29 - July 1, 2015 <http://mcs.diee.unica.it>
 - CIDM 2015, IEEE Symposium on Computational Intelligence and Data Mining December 7-10, 2015, Cape Town, South Africa <http://neuro.informatik.uni-ulm.de/CIDM2015/>
 - ICVSS2016, the International Computer Vision Summer School 17-23 July 2016, Sicily, Italy. <http://svg.dmi.unict.it/icvss2016/>
 - MPRSS 2016, Multimodal pattern recognition for social signal processing in human computer interaction, Cancun, Mexico, December 4, 2016, CPR 2016 Satellite Workshop <http://neuro.informatik.uni-ulm.de/MPRSS2016/>
 - CIDM 2016, IEEE Symposium on Computational Intelligence and Data Mining, December 6-9, 2016, Athens, Greece. <http://neuro.informatik.uni-ulm.de/CIDM2016/>

2.1.4 ANNPR2016

- The 7th TC3 IAPR Workshop on Artificial Neural Networks for Pattern Recognition (ANNPR 2016) will be held in September 28-30th, 2016 at Ulm University, Germany. The proceeding is published in the Springer Lecture Notes on Artificial Intelligence No 9896. The workshop is organized by Hazem M. Abbas (Ain Shams University, Egypt), Friedhelm Schwenker (Ulm University, Germany), Neamat El Gayar (Cairo University, Egypt) and Edmondo Trentin (Università di Siena, Italy). The Program Committee of the ANNPR 2016 workshop selected 25 papers out of 32 for the scientific program, organized in regular oral presentations. The workshop is enriched by two IAPR invited sessions: **A Spiking Neural Network for Personalized Modelling of Electrogastography (EGG)** given by *Prof. Nikola Kasabov*, Auckland University of Technology, New Zealand and **Learning Sequential Data with the Help of Linear Systems** presented by *Prof. Alessandro Sperduti*, University of Padua, Italy. In addition, *Prof. Andreas Knoblauch*, Albstadt-Sigmaringen University, Germany will give a presentation on **Associative Neural Networks Memories**. <http://neuro.informatik.uni-ulm.de/ANNPR2016/>
- Authors of selected papers from ANNPR2016 will be invited to submit an extended version of their articles to a dedicated special issue of the journal Neural Processing Letters (refer to 2.1.5 for details), guest-edited by the ANNPR2016 chairs and titled "**Off the mainstream: advances in neural networks and machine learning for pattern recognition**".

2.1.5. Special issue in Neural Processing Letters

- The special issue on ***Off the mainstream: advances in neural networks and machine learning for pattern recognition*** will be published in Neural Processing Letters. Submission deadline is January 31, 2017. Tentative publication of the Special Issue is Fall 2017

- Guest editors: Edmondo Trentin, University of Siena, Italy (trentin@dii.unisi.it), Friedhelm Schwenker, University of Ulm, Germany, (friedhelm.schwenker@uni-ulm.de), Neamat El Gayar, Cairo University, Egypt (elgayar.neamat@gmail.com), Hazem M. Abbas, Ain Shams University, Egypt (as@eng.asu.edu.eg)
- This special issue invites paper submissions on novel research developments in the areas of neural networks and learning machines that (1) are rooted in (or, aimed at) pattern recognition (PR), and that, above all, (2) do not follow in the footsteps of nowadays established ‘over-beaten’ trends. Preference will thus be given to submissions that hand out fresh and innovative ideas/architectures/algorithms, even if they are in their infancy. Some general, topical research directions are: new ANN or ML architectures, new estimation/optimization/assessment techniques for ANNs, ML, or PR, new and sound combination/hybridization of machines and solutions to new relevant PR-related problems
- The special issue will comprise (a) papers submitted in response a call for contributions, and (b) extended versions of selected papers from the ANNPR 2016 Workshop.
- Papers are submitted via the Neural Processing Letters website <https://www.editorialmanager.com/nepl/default.aspx>

2.2 Website updates:

A domain name for TC3 website was purchased (www.icpr-tc3.org). The website has been re-organized and valuable educational material has been added.

Following educational information and resources have been added related to current hot topics in the area of computational intelligence

2.2.1 Research Directions:

- Deep learning has become a popular variant of neural networks typically possessing multiple representation layers, with higher-levels representing more abstract concepts. Deep learning is related to cognitive computing and has shown successes in applications involving sets of Big Data.
 - Nature paper on Deep Learning by Yann LeCun, Yoshua Bengio and Geoff Hinton
www.nature.com/nature/journal/v521/n7553/full/nature14539.html
 - [Deep Learning - an MIT Press book in preparation](#)
 - [Representation Learning: A Review and New Perspectives](#), Yoshua Bengio, Aaron Courville and Pascal Vincent, U.
 - [Geoffrey Hinton talks about Deep Learning](#), Google, and Everything...
- Recurrent Nets
 - [Jürgen Schmidhuber's](#) page on [Recurrent Neural Networks](#)
 - [A deep LSTM model to do machine translation](#)
- Large scale learning and big data challenges:
 - [Google's map-reduce paradigm](#) to speed up learning algorithms including locally weighted linear regression (LWLR), k-means, logistic regression (LR), naive Bayes (NB), SVM, ICA, PCA, gaussian discriminant analysis (GDA), EM, and backpropagation (NN)
 - Yurii Nesterov's talk about how to solve certain optimization problems that arise from ML in time that is [logarithmic in the number of parameters](#)
 - [A method of performing distributed feature selection](#)
- Biologically inspired robot learning

2.2.2 Tutorial and Teaching Material/Demos

- Deep Learning: [Talks and Tutorials by Yoshua Bengio](#)
- [Where to Learn Deep Learning – Courses, Tutorials, Software](#)
- [Research Network for Self-Organization of Robot Behavior](#)

2.2.3 Data Sets and Evaluation Tools

- [Popular Deep Learning Tools - a review](#)
- Recurrent Neural Networks (RNNs) and their application to Pattern Recognition LSTM Tutorial and open source toolkits <http://lstm.iupr.com>
- [A benchmark of recognizing objects in images](#): ImageNet Large Scale Visual Recognition Challenge (Application of Deep learning)
- [UC Irvine Machine Learning Repository](#)

3. Plans & Recommendations (until ICPR2016 and beyond)

- In preparation for ANNPR 2018 a call for proposals to host ANNPR 2018 will be sent out by January 2017. The proposals will be evaluated by the steering committee of TC3 and the decision will be finalized by March 15th 2017.
- We are studying organizing a summer school for graduate students in some promising trends of computational intelligence and neural networks. We will seek the support and endorsement of IAPR for that.
- For the TC3 website we are still planning to work on restructuring and adding more material related to application areas and successful projects. The support of IAPR is appreciated to fund some web space and restructuring expenses.
- TC3 will receive a new leadership team for the 2016-2018 term