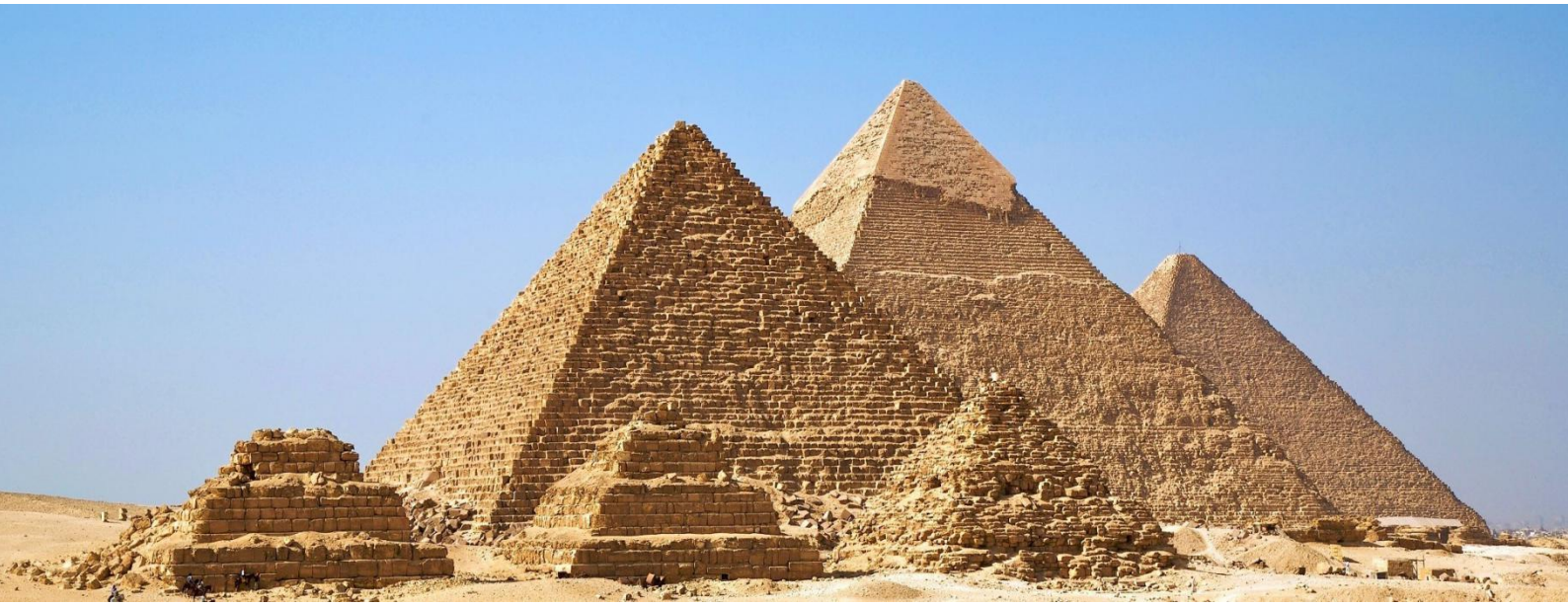
17th International Symposium on Neural Networks

December 4-6, 2020

Cairo, Egypt and the Internet

Final Program



Sponsors/Organizers:

The British University in Egypt

City University of Hong Kong

Technical co-sponsors:

International Neural Network Society

Asian Pacific Neural Network Society

Proceedings publishers:

Springer

Lecture Notes in Computer Science

Welcome Messages

On behalf of the Organizing Committee of the 17th International Symposium on Neural Networks (ISNN 2020), we welcome you to attend this event taking place in Cairo, Egypt and over the Internet during December 4-6, 2020. Thanks to the success of the previous events, ISNN has become a well-established series of popular and high-quality conference on the theory and methodology of neural networks and their applications. This year's symposium was postponed for more than two months due to the COVID-19 pandemic. But it still achieved great success. ISNN aims at providing a high-level international forum for scientists, engineers, educators, and students to gather so as to present and discuss the latest progress in neural network research and applications in diverse areas. This symposium encouraged open discussion and exchange of ideas. We believed that it would extensively promote research in the fields of neural networks and applications.

This year, the conference received 39 submissions, much less submissions than previous years, due to an obvious reason. Each submission was reviewed by at least three, and on average, four program committee members. After the rigorous peer reviews, the committee decided to accept 26 papers for publication in the Lecture Notes in Computer Science (LNCS) proceedings with an acceptance rate of two thirds. These papers cover many topics of neural network-related research including computational intelligence, neurodynamics, stability analysis, deep learning, pattern recognition, image processing and so on. In addition to the contributed papers, ISNN2020 technical program includes two plenary speeches by world renowned scholars: Prof. Tingwen Huang (IEEE Fellow) at the Texas A&M University at Qatar and Prof. Dongbin Zhao (IEEE Fellow) at Institute of Automation, Chinese Academy of Sciences.

Many organizations and volunteers made great contributions toward the success of this symposium. We would like to express our sincere gratitude to the British University in Egypt and City University of Hong Kong for their sponsorship, the International Neural Network Society, Asian Pacific Neural Network Society, for their technical co-sponsorship. We would also like to sincerely thank all the committee members for their great efforts in organizing the symposium. Special thanks to the Program Committee members and reviewers whose insightful reviews and timely feedback ensured the high quality of the accepted papers and the smooth flow of the symposium. We would also like to thank Springer for their cooperation in publishing the proceedings in the prestigious LNCS series. Finally, we would like to thank all the speakers, authors, and participants for their support.

Samir Abou El-Seoud and Omar H. Karam, General Chairs

Yehia Bahei-El-Din and Jun Wang, Organizing Chairs

Min Han, Sitian Qin, and Nian Zhang, Program Chairs

ISNN History

16th International Symposium on Neural Networks (ISNN 2019), July 10-12, 2019, Moscow, Russia

15th International Symposium on Neural Networks (ISNN 2018), June 25-28, 2018, Minsk, Belarus

14th International Symposium on Neural Networks (ISNN 2017), June 21-26, 2017, Sapporo, Japan

13th International Symposium on Neural Networks (ISNN 2016), July 6-8, 2016, Saint Petersburg, Russia

12th International Symposium on Neural Networks (ISNN 2015), October 15-18, 2015, Jeju, Korea

11th International Symposium on Neural Networks (ISNN 2014), November 28-December 1, 2014, Hong Kong and Macao

10th International Symposium on Neural Networks (ISNN 2013), July 4-6, 2013, Dalian, China

9th International Symposium on Neural Networks (ISNN 2012), July 11-14, 2012, Shenyang, China

8th International Symposium on Neural Networks (ISNN 2011), May 29-June 1, 2011, Guilin, China

7th International Symposium on Neural Networks (ISNN 2010), June 6-9, 2010, Shanghai, China

6th International Symposium on Neural Networks (ISNN 2009), May 26-29, 2009, Wuhan, China

5th International Symposium on Neural Networks (ISNN 2008), September 24-28, 2008, Beijing, China

4th International Symposium on Neural Networks (ISNN 2007), June 3-7, 2007, Nanjing, China

3rd International Symposium on Neural Networks (ISNN 2006), May 28-June 1, 2006, Chengdu, China

2nd International Symposium on Neural Networks (ISNN 2005), May 30-June 1, 2005, Chongqing, China

1st International Symposium on Neural Networks (ISNN 2004), August 19-21, 2004, Dalian, China

ISNN 2020 Program at a Glance (December 4-6, 2020)		
December 4, 2020		
14:00-14:15	Opening Ceremony	Room ID:705 607 778
14:15-15:15	Keynote Speech I	
15:30-16:30	Keynote Speech II	
December 5, 2020		
08:00-09:40	S1: Neurodynamic Analysis and Optimization	Room ID:889 881 698
09:40-10:00	Coffee break	
10:00-12:00	S2: Pattern Recognition	Room ID:889 881 698
Lunch Break		
14:00-16:20	S3: Data and Image Processing	Room ID:679 530 451
December 6, 2020		
10:00-11:20	S4: Swarm Optimization Applications	Room ID:445 256 152
Lunch Break		
14:00-16:00	S5: Other Applications	Room ID:445 256 152

Room ID is the Tencent/VooV meeting ID. All password is 202012.

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Bo Zhou	Southwest University, China

Instructions for Oral Presentations

- Oral Presentation Time: 20 minutes, including 17 minutes for presentation, and 3 minutes for Q&A.
- Presentation Form: Due to the Coronavirus, the oral presentation sessions in ISNN2020 will be conducted online using Tencent Meeting as the platform. Please download and install the Tencent Meeting before the session using the following links:

  The Mainland China version

  https://meeting.tencent.com/

  The International version (VooV Meeting):

  https://voovmeeting.com
- Every session has a Tencent Meeting ID. Please find your session and the corresponding ID. The password is: 202012. The presenter is required to enter the meeting 10 minutes before the session starts, and inform the session chairs that he/she is present. If the session chairs are absent, the first presenter in the session becomes the session chair.
- When you enter the meeting, please mute your speaker in the Tencent Meeting. Before your presentation, please unmute it. The general presentation software such as Microsoft PowerPoint and Adobe Reader can be used. Please use the screen sharing function of the Tencent Meeting to share your slides.

Keynote Speeches

Keynote Speech I:

Dynamics and Analysis of Coupled Reaction-Diffusion Neural Networks

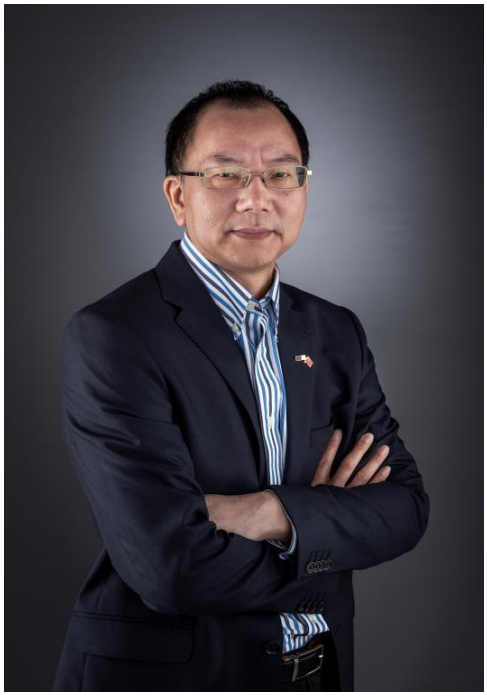
Professor Tingwen Huang, IEEE Fellow

Texas A&M University at Qatar, Qatar

Abstract

This talk focuses on dynamical analysis of coupled reaction-diffusion neural networks (CRDNN). Since neural networks are implemented by electric circuits, and the diffusion phenomena inevitably appear in electric circuits once electrons transport in a non-uniform electromagnetic field. It is critical to investigate the diffusional phenomena in coupled neural networks. We will discuss the dynamics such as the stability, synchronization, passivity of the neural networks with reaction-diffusion, and present several effective and powerful strategies such as adaptive strategy for the CRDNN reaching synchronization.

Biosketch



Tingwen Huang is a Professor at Texas A&M University at Qatar, an IEEE Fellow. He received his B.S. degree from Southwest Normal University (now Southwest University), China, 1990, his M.S. degree from Sichuan University, China, 1993, and his Ph.D. degree from Texas A&M University, College Station, Texas, 2002. After graduated from Texas A&M University, he worked as a Visiting Assistant Professor there. Then he joined Texas A&M University at Qatar (TAMUQ) as an Assistant Professor in August 2003, then he was promoted to Professor in 2013. Dr. Huang's research areas include neural networks, chaotic dynamical systems, complex networks, optimization and control, smart grid. He was named the Highly Cited Researcher by Clarivate Analytics (2018, 2019). One of his National Priority Research Project was awarded the Best Research Project by Qatar National Research Fund in 2015. Currently, he is the President of Asia Pacific Neural Networks Society (2020).

Keynote Speech II:

Deep reinforcement learning for game AIs and others

Professor Dongbin Zhao, IEEE Fellow

Institute of Automation, Chinese Academy of Sciences, China University of Chinese Academy of Sciences, China

Abstract

Deep reinforcement learning (DRL) plays more and more important role as a major artificial intelligence (AI) algorithm, by combining the merits of the decision ability of reinforcement learning and the perception ability of deep learning. This research hotspot laid several milestones in AI by Google DeepMind, such as the DQN algorithm to conquer the Atari video games, AlphaGo for Go, AlphaZero for a more general board games, and AlhpaStar for real-time strategy game Starcraft II, together with several papers in Nature and Science. Other teams in OpenAI and Microsoft also had great achievements in Dota2 video game and Mahjong separately with the strong support of DRL algorithm. This talk will briefly introduce these major achievements and corresponding typical DRL algorithms, and present some efforts on fighting game and other game AIs, and other interesting robotic applications from the speaker's group.

Biosketch

Dongbin Zhao is a professor at Institute of Automation, Chinese Academy of Sciences since 2002, and also a professor with the University of Chinese Academy of Sciences, China. From 2007 to 2008, he was also a visiting scholar at the University of Arizona. He has published 6 books, and over 90 international journal papers. He received the Outstanding Paper Reward of IEEE Transactions on Cognitive and Developmental Systems, etc. He won 3 championships of 2020 Robomaster AI Challenge, and the Championship of 2020 Fighting AI Competition, etc. His current research interests are in the area of deep reinforcement learning, computational intelligence, autonomous driving, game artificial intelligence, robotics, etc. Dr. Zhao serves as the Associate Editor of IEEE Transactions on Neural Networks and Learning Systems, IEEE Transactions on Cybernetics, IEEE Transactions on Artificial Intelligence, etc. He is the chair of Distinguished Lecture Program of IEEE Computational Intelligence Society. He is involved in organizing many international conferences. He is an IEEE Fellow.

Technical Program

All time slots are in Cairo Time

（A conversion table of world clocks is listed at the end）

December 4, 2020

14:00-14:15 Opening Ceremony

14:15-15:15
Keynote Speech I - *Dynamics and Analysis of Coupled Reaction-Diffusion Neural Networks*
Prof. Tingwen Huang, IEEE Fellow
Texas A&M University at Qatar, Doha, Qatar

15:30-16:30
Keynote Speech II - *Deep reinforcement learning for game AIs and others*
Prof. Dongbin Zhao, IEEE Fellow
Institute of Automation, Chinese Academy of Sciences,
University of Chinese Academy of Sciences, Beijing, China

December 5, 2020

S1: Neurodynamic Analysis and Optimization
Chairs: Sitian Qin and Jiasen Wang

8:00 - 8:20 *Finite-Time Stability Analysis of Delayed Genetic Regulatory Networks with Reaction-Diffusion Terms via A Linear Parameterization Approach*

Shasha Xiao and Zhanshan Wang

8:20 - 8:40 *Stability and Boundedness of Solutions for a Second Order Neutral Functional Differential Equation via Lyapunov's Direct Method*

Adeleke Ademola, Yuming Feng, Wei Zhang and Zitao Wang

8:40 - 9:00 *Complex Dynamic Behaviors in a Discrete Chialvo Neuron Model Induced by Switching Mechanism*

Yi Yang, Changcheng Xiang, Xiangguang Dai, Liyuan Qi, and Tao Dong

9:00 - 9:20 *A Neural Network for Distributed Optimization over Multiagent Networks*

Jiazhen Wei, Sitian Qin and Wei Bian

9:20 - 9:40 *Dynamically Weighted Model Predictive Control of Affine Nonlinear Systems Based on Two-timescale Neurodynamic Optimization*

Jiasen Wang, Jun Wang and Dongbin Zhao

9:40 - 10:00 Coffee break

S2: Pattern Recognition
Chairs: Long Cheng and Wenwu Yu

10:00 -10:20 *Pattern Recognition Based on Improved Szmidt and Kacprzyk's Correlation Coefficient in Pythagorean Fuzzy Environment*

Paul Augustine Ejegwa, Yuming Feng and Wei Zhang

10:20 -10:40 *Fugl-Meyer Hand Motor Imagination Recognition for Brain-Computer Interfaces Using only fNIRS*

Chenguang Li, Hongjun Yang and Long Cheng

10:40 -11:00 *A Frequent Item Mining Approach to Botnet Detection*

Siqiang Hao, Di Liu, Simone Baldi and Wenwu Yu

11:00 -11:20 *AlTwo: Vehicle Recognition in Foggy Weather Based on Two-step Recognition Algorithm*

Fengxin Li, Ziye Luo, Jingyu Huang, Lingzhan Wang, Jinpu Cai, and Yongping Huang

11:20 - 11:40 *Deep Point Cloud Odometry: a Deep Learning Based Odometry with 3D Laser Point Clouds*

Chi Li, Yisha Liu, Fei Yan and Yan Zhuang

11:40 - 12:00 *A Visually Impaired Assistant Using Neural Network and Image Recognition with Physical Navigation*

On-Chun Arthur Liu, Shun-Ki Li, Li-Qi Yan, Sin-Chun Ng and Chok-Pang Kwok

Lunch Break

S3: Data and Image Processing
Chairs: Jianchao Fan and Yaran Chen

14:00 - 14:20 *Robust Graph Regularized Non-negative Matrix Factorization for Image Clustering*

Xianguang Dai, Keke Zhang, Juntang Li, Jiang Xiong and Nian Zhang

14:20 - 14:40 *ContourRend: A Segmentation Method for Improving Contours by Rendering*

Junwen Chen, Yi Lu, Yaran Chen, Dongbin Zhao and Zhonghua Pang

14:40 - 15:00 *Edge Information Extraction of Overlapping Fiber Optical Microscope Imaging Based on Modified Watershed Algorithm*

Cheng Xing, Jianchao Fan, Xinzhe Wang and Jun Xing

15:00 - 15:20 *Imputation of Incomplete Data Based on Attribute Cross Fitting Model and*

Iterative Missing Value Variables

Jinchong Zhu, Liyong Zhang, Xiaochen Lai and Genglin Zhang

15:20 - 15:40 *Semantic Modulation Based Residual Network for Temporal Language Queries Grounding in Video*

Cheng Chen and Xiaodong Gu

15:40 -16:00 *Supply Chain Financing Model with Data Analysis under the Third-party Partial Guarantee*

Shengying Zhao and Xiangyuan Lu

16:00 - 16:20 *Detecting Apples in Orchards Using YOLOv3 and YOLOv5 in General and Close-up Images*

Anna Kuznetsova, Tatiana Maleva and Vladimir Soloviev

December 6, 2020

S4: Swarm Optimization Applications
Chairs: Weineng Chen and K. Moloi

10:00 - 10:20 *Parameters Identification of Solar Cells Based on Classification Particle Swarm Optimization Algorithm*

Haijie Bao, Chuyi Song, Liyan Xu, and Jingqing Jiang

10:20 - 10:40 *Online Data-driven Surrogate-Assisted Particle Swarm Optimization for Traffic Flow Optimization*

Shuowei Cai, Shicheng Zha and Weineng Chen

10:40 - 11:00 *A PSO Based Technique for Optimal Integration of DG into the Power Distribution System*

K. Moloi, J. A. Jordaan and Y. Hamam

11:00 -11:20 *A Quantum-Inspired Genetic K-Means Algorithm for Gene Clustering*

Chun Hua and Narengerile Liu

Lunch Break

S5: Other Applications
Chairs: Nian Zhang and Xiangguang Dai

14:00 -14:20 *Multi-Resolution Statistical Shape Models for Multi-Organ Shape Modelling*

Zhonghua Chen, Tapani Ristaniemi, Fengyu Cong and Hongkai Wang

14:20 – 14:40 *Spark Parallel Acceleration-based Optimal Scheduling for Air Compressor Group*

Long Chen, Xiaojuan Zhang, Jun Zhao, Long Chen, and Wei Wang

14:40 -15:00 *Adaptive Gaussian Noise Injection Regularization for Neural Networks*

Yinan Li and Fang Liu

15:00 -15:20 *An Efficient Method of Advertising on Online Social Networks*

Xitao Zou, Huan Liu, Xiangguang Dai, Jiang Xiong and Nian Zhang

15:20 -15:40 *On Position and Attitude Control of Flapping Wing Micro-Aerial Vehicle*

Dexiu Ma, Long Jin, Dongyang Fu, Xiuchun Xiao and Mei Liu

15:40 -16:00 *Development of a Drought Prediction System Based on Long Short-Term Memory Networks (LSTM)*

Nian Zhang, Xiangguang Dai, M. A. Ehsan, and Tolessa Deksissa

Conversion of Cairo Time, Beijing Time, and WashingtonTime

Cairo Time	Beijing Time	Washington Time
8:00	14:00	1:00
8:20	14:20	1:20
8:40	14:40	1:40
9:00	15:00	2:00
9:20	15:20	2:20
9:40	15:40	2:40
10:00	16:00	3:00
10:20	16:20	3:20
10:40	16:40	3:40
11:00	17:00	4:00
11:20	17:20	4:20
11:40	17:40	4:40
14:00	20:00	7:00
14:20	20:20	7:20
14:40	20:40	7:40
15:00	21:00	8:00
15:20	21:20	8:20
15:40	21:40	8:40
16:00	22:00	9:00
16:20	22:20	9:20