Preface

Artificial Intelligence technology is of interest to many people around the world, including people in fields like science, technology and policy making. It is believed that AI will transform society in profound and, as yet, not fully understood ways. At the core of this transformation is the deployment of AI in applications that will improve the quality of life - or wellbeing - of the world’s population. IJCAI 2019 has a special track on AI for improving human-wellbeing in order to encourage research in this important area. Machine Learning techniques play a fundamental role in AI research and development. However, it is still unclear how more complex reasoning can be implemented and integrated with the progress we have seen from deep learning. The second special track of IJCAI 2019, understanding intelligence and human-level AI in the new machine learning era, considers the research of how far we have really come in terms of developing human-level AI and how we can bridge the remaining gap.

IJCAI-2019 has received a record number of 4,752 submitted papers (a 37% increase over IJCAI-ECAI 2018, itself a record breaker), of which 850 submissions have been accepted (17.8%). The special track on understanding intelligence and human-level AI in the new machine learning era and the special track on AI for improving human-wellbeing received 47 and 234 papers, respectively, of which 8 and 39 were accepted (respectively). All papers will have an oral presentation and will also be displayed as posters at the conference venue. Almost all of the papers received four reviews. The Program Committee consisted of 73 area chairs, 740 senior program committee members, 2,696 program committee members, 78 reviewers and 352 review assistants: this makes a total of 3,939 researchers who performed careful and rigorous reviews, discussed the papers and came to a recommendation. Authors had the opportunity to provide feedback to their reviews, which was then analyzed by the reviewing team at the time of discussion.

As in previous years, we have a journal track: these proceedings include 8 abridged versions of papers that have been published in AIJ and JAIR, and one paper from a special issue of the IBM Journal of Research and Development, without having ever been presented at a major conference. Again, as in previous years, we have a sister conference best paper track: these proceedings include 25 revised versions of award-winning papers from some of the top-level specialized AI conferences. We have 16 early career spotlight talks given by outstanding researchers who are 5 to 10 years post-doc; most of their talks come with a paper in the proceedings, providing a synthesis of their past and current research. Like last year, we have a survey track that provides an opportunity for AI researchers who are experts on a specific topic to give a talk presenting a synthesis survey of the topic and to publish a paper in the proceedings. We received 68 submissions, of which 12 were accepted. We also have, as usual, a demo track. These proceedings include short papers describing the accepted demos.

We have seven outstanding invited speakers: Giuseppe de Giacomo (Univ. Roma “La Sapienza”), Leslie Kaelbling (MIT), Zhi-Hua Zhou (Nanjing University), Adnan Darwich (UCLA), Hadas Kress-Gazit (Cornell University), Hiroaki Kitano (Sony Computer Science Laboratories) and Michela Milano (University of Bologna). We also have talks by the winners of these prestigious awards: the 2019 IJCAI Award for Research Excellence (Yoav Shoham), the 2019 John McCarthy Award (Pedro Domingos) and the 2019 Computers and Thought Award (Guy Van den Broeck).

A conference the size and scope of IJCAI-2019 requires tremendous effort from many people, to whom we are very grateful. First of all, the authors, who submitted the best of their work to this conference. Second, the program committee members, who made an effort to cope with the deadlines and the heavy load of work. Third, all of the people who helped in the different stages of the review process, especially Francisco (Tito) Cruz and Marc Pujol, who helped at all stages of the submission, review and program construction processes, and who spent weeks performing paper formatting quality control and giving professional feedback to the authors. Many others have helped in different phases of the process: Thomas Preuss, who gave constant technical support on ConfMaster; Laurent Charlin and Richard Zemel, who made the Toronto Paper Matching System (TPMS) available for the paper bidding phase; Blai Bonet, whose paper-to-reviewer software was used once again; and Marta Abad, who produced the program brochure. In addition to those whose work made the content of the conference possible, many worked to make the operation of the conference possible. The local arrangements committee (LAC) did a tremendous job for which we are very thankful. The LAC was co-chaired by Zhiguo Gong and Yangqiu Song. Andrew Jiang served as the local arrangement manager. The local arrangements require significant effort and we are very grateful to all of the LAC members: Dou Shen, Yilei Shao, Yu Zheng, Jingdong, Leong Hou, Yang Liu, Yiqiang Chen, Jindong Wang, Han Yu, Mikael Hansson, Xiaoping Chen, Derek Fai Wong, Jingzhi Guo, Shirley Siu, Hongming Zhang, Simon Fong, Chengqi Zhang, Yiyang Yang and Yuhong.

Finally, Vesna Sabljakovic-Fritz, Executive Secretary for IJCAI, deserves a huge thanks! She knows everything about IJCAI, its history and its practices, and she is always on top of everything. It would have been impossible for us to manage without her.

- Sarit Kraus (Program Chair)
- Thomas Eiter (Conference Chair)
IJCAI-19 Conference Organisation

Conference Committee

Conference Chair
Thomas Eiter (Vienna University of Technology, Austria)

Program Chair
Sarit Kraus (Bar-Ilan University, Israel)

Local Arrangements Committee Chairs
Zhiguo Gong (University of Macau, Macau, China)

IJCAI Executive Secretary
Vesna Sabljakovic-Fritz (Vienna University of Technology, Austria)

IJCAI Secretary-Treasurer
Bernhard Nebel (Albert-Ludwigs-Universität Freiburg, Germany)

Track Chairs

Program Committee Chair
Sarit Kraus (Bar-Ilan University, Israel)

Tutorials Chairs
Edith Elkind (University of Oxford, UK)
Mary-Anne Williams, University of Technology Sydney, Australia

Workshop Chairs
David Sarne (Bar-Ilan University, Israel)
Amal El Fallah Seghrouchni (University Pierre and Marie Curie (Paris 6), France)

Demo Chairs
Jörg P. Müller (Clausthal University of Technology, Germany)
Jie Zhang (Nanyang Technological University, Singapore)

Doctoral Consortium
Pradeep Varakantham (Singapore Management University, Singapore)
Chitta Baral (Arizona State University, USA)

Robot Exhibition Chairs
Xiaoping Chen (University of Science and Technology of China)
Francesco Amigoni (Politecnico di Milano, Italy)

Video Competition Chairs
Takayuki Ito (Nagoya Institute of Technology, Japan)

Subramanian Ramamoorthy (University of Edinburgh, UK)

Survey chairs
Virginia Dignum (Umeå University, Sweden)
Fangzhen Lin (The Hong Kong University of Science and Technology, Hong Kong, China)

Sister Conference Best Papers
Scott Sanner (University of Toronto)
Roni Stern (Ben-Gurion University Israel)

Journal Track
Noam Hazon (Ariel University, Israel)

Special Track on Understanding Intelligence and Human-level AI in the New Machine Learning era
Track Chairs
Dan Roth (University of Pennsylvania, USA)
Sebastian Riedel (University College London and Facebook AI Research, UK)

Special Track on AI for Improving Human-Well Being Track Chairs
Carla P. Gomes (Cornell, USA)
Jonathan Schaeffer (University of Alberta, USA)

Advisory Committee

Franz Baader (TU Dresden)
Chitta Baral (Arizona State University)
Stefano Ermon (Stanford University)
Aditya Ghose (University of Wollongong)
Yolanda Gil (University of Southern California)
Takayuki Ito (Nagoya Institute of Technology)
Gal A. Kaminka (Bar-Ilan University)
Gerhard Lakemeyer (RWTH Aachen)
Nada Lavrac (Jozef Stefan Institute)
Shaul Markovich (Technion)
Paola Mello (University of Bologna)
Michaela Milano (University of Bologna)
Hideyuki Nakashima (Sapporo City University)
Yun Raymond Fu (Northeastern University)
Marie-Christine Rouset (Laboratoire d’Informatique de Grenoble)
Jonathan Schaeffer (University of Alberta)
Gerardo I. Simari (Universidad Nacional del Sur)
VS Subrahmanian (Dartmouth College)
Sylvie Thiebaux (Australian National University)
Chengqi Zhang (University of Technology Sydney)
Local Arrangements Committee

Local Arrangements Co-Chairs
Zhiguo Gong (University of Macau, Macao, China)
Yangqiu Song (The Hong Kong University of Science and Technology, Hong Kong, China)

Sponsorship Chair
Dou Shen (Baidu, China)

Sponsorship Co-Chair
Yilei Shao (Highlights Academy, China)

Industry Day Chair
Yu Zheng (Jingdong, China)

Exhibition Chair
Leong Hou U (University of Macau, Macao, China)

Competition Chair
Yang Liu (Webank, China)

Finance Chair
Andrew Jiang (Macau Convention and Exhibition Association, Macao, China)

Publicity Co-Chairs
Yiqiang Chen (Institute of Computing Technology, Chinese Academy of Science, China)
Jindong Wang (Institute of Computing Technology, Chinese Academy of Science, China)
Han Yu (Nanyang Technological University, Singapore)
Mikael Hansson (Umeå University, Sweden)

Robotics Competition and Demonstration Chair
Xiaoping Chen (University of Science and Technology of China, China)

Workshop Coordinator
Derek Fai Wong (University of Macau, Macao, China)

Tutorial Coordinator
Jingzhi Guo (University of Macau, Macao, China)

High School AI Festival Coordinator
Shirley Siu (University of Macau, Macao, China)

Web Master
Hongming Zhang (The Hong Kong University of Science and Technology, Hong Kong, China)

Job Match Coordinator
Simon Fong (University of Macau, Macao, China)

IJCAI Sponsorship Officer
Chengqi Zhang (University of Technology Sydney, Australia)

Student Volunteer Chairs
Yiyang Yang (Guangdong University of Technology, China)
Yuhong Li (Alibaba, China)
Program Committee

Main Track Program Committee

Area Chairs

Leila Amgoud (Centre National de la Recherche Scientifique (CNRS))
Timothy Baldwin (The University of Melbourne)
Isabelle Bloch (LTCCI; Télécom ParisTech; Université Paris-Saclay)
Craig Boutilier (Google)
Longbing Cao (University of Technology Sydney)
Soumen Chakrabarti (IIT Bombay)
Seungjin Choi (Pohang University of Science and Technology, Department of Computer Science and Engineering)
Alessandro Cimatti (Fondazione Bruno Kessler)
Ian Davidson (University of California - Davis)
Ulle Endriss (ILLC, University of Amsterdam)
Ariel Felner (Ben-Gurion University)
Johannes Fürnkranz (TU Darmstadt, Knowledge Engineering Group)
Juergen Gall (University of Bonn)
Roman Garnett (Washington University in St. Louis)
Hector Geffner (ICREA & Universitat Pompeu Fabra)
Maria Gini (University of Minnesota, Computer Science and Engineering)
Lluís Godo (IIIA-CSIC, Logic and Reasoning)
Malte Helmert (University of Basel)
Jim Hendler (RPI, Institute for Data Exploration and Applications)
Julia Hirschberg (Columbia University, Computer Science)
Jesse Hoey (University of Waterloo, Computer Science)
Holger Hoos (Leiden University, LIACS)
Jonathan How (MIT, Aeronautics and Astronautics)
Heng Huang (University of Pittsburgh, Electrical and Computer Engineering)
Sinno Jialin Pan (Nanyang Technological University, Singapore)
Igor Jurisica (Krembil Research Institute, UHN)
Subbarao Kambhampati (Arizona State University)
Yossi Keshet (Bar-Ilan University)
Nevin L Zhang (The Hong Kong University of Science and Technology)
Peter L Bartlett (UC Berkeley, CS & Statistics)
Jure Leskovec (Stanford University)
Kevin Leyton-Brown (University of British Columbia, Computer Science)
Maxim Likhachev (Carnegie Mellon University, The Robotics Institute)
Bing Liu (University of Illinois at Chicago, Computer Science)
Huan Liu (Arizona State University)
Alessio Lomuscio (Imperial College London)
Thomas Lukasiewicz (University of Oxford)
Michael Mahoney (UC Berkeley, Statistics)
Madhav Marathe (University of Virginia, Biocomplexity Institute and Initiative & Dept. of Computer Science)
Sheila McIlraith (University of Toronto, Department of Computer Science)
Risto Miikkulainen (The University of Texas at Austin)
Bamshad Mobasher (DePaul University, School of Computing)
Michael Ng (Hong Kong Baptist University)
Vincent Ng (University of Texas at Dallas)
Tim Oates (UMBC, University of Maryland Baltimore County)
Doina Precup (McGill University / DeepMind)
Pradeep Ravikumar (Carnegie Mellon University)
Francesco Ricci (Free University of Bozen-Bolzano, Faculty of Computer Science)
Daniel Rueckert (Imperial College London, Computing)
Thomas Schiex (INRA, Applied Mathematics and Computer Science)
Björn Schuller (Imperial College London, University of Augsburg)
Sandip Sen (The University of Tulsa, Tandy School of Computer Science)
Carles Sierra (Artificial Intelligence Research Institute, IIIA-CSIC)
Stefano Soatto (University of California, Los Angeles)
Aya Soffer (IBM Research)
Peter Stone (University of Texas at Austin)
Ayellet Tal (Technion-Israel Institute of Technology, Department of Electrical Engineering)
Pang-Ning Tan (Michigan State University, Computer Science and Engineering)
Dacheng Tao (University of Sydney, UBTECH Sydney Artificial Intelligence Centre)
Francesca Toni (Imperial College London)
Hwee Tou Ng (National University of Singapore)
Ruth Urner (York University, Lassonde School of Engineering, EECS Department)
Manik Varma (Microsoft Research)
Jingdong Wang (Microsoft Research)
Daphna Weinshall (Hebrew University of Jerusalem, School of Computer Science and Engineering)
Scott Wen-tau Yih (Facebook AI Research)
Xing Xie (Microsoft Research Asia)
Shuiyeng Yan (National University of Singapore)
Qiang Yang (Hong Kong University of Science and Technology, Computer Science and Technology)
Dit-Yan Yeung (Hong Kong University of Science and Tech-
nology, Computer Science and Engineering)
Mohammed Zaki (RPI, Computer Science)
Chengqi Zhang (University of Technology Sydney)
Xiaojin Zhu (University of Wisconsin-Madison)

Senior Program Committee Members

Hussein Abbass
Naoki Abe
Sibel Adali
Charu C. Aggarwal
Thomas Agotnes
Karteek Alahari
Harith Alani
Natasha Alechina
Jose Julio Alferes
Tansu Alpcan
Analia Amandi
Chris Amato
Xavier Amatriain
Francesco Amigoni
Bo An
Aris Anagnostopoulos
Plamen Angelov
Cecilio Angulo
André Anjos
Grigoris Antoniou
Annalisa Appice
Cedric Archambeau
Katie Atkinson
Tsz-Chiu Au
Gilles Audemard
Vincenzo Auletta
Haris Aziz
Franz Baader
Yoram Bachrach
Xiang Bai
Lamberto Ballan
Bikramjit Banerjee
Arindam Banerjee
Etienne Barnard
Roman Barták
Roberto Basili
Gustavo Batista
Christian Bauckhage
Ana Bazzan
Luca Becchetti
Srikanta Bedathur
Sven Behnke
Francesco Belardinelli
Danielle Belgrave
Rachel Bellamy
Michael Benedikt
Salem Benferhat
Daniel Berrar
Christian Bessiere
Alex Beutel
Aurélie Beynier
Mehul Bhatt
Pushpak Bhattacharyya

Chiranjib Bhattacharyya
Isabelle Bichindaritz
Maria Bielikova
Meghyn Bienvenu
Armin Biere
Albert Bifet
Yngvi Björnsson
Elisabeth Black
Hendrik Blockeel
Danushka Bollegala
Francesco Bonchi
Blai Bonet
Richard Booth
Giacomo Boracchi
Rafael H. Bordini
Vicent Botti
Guillaume Bouchard
Sylvain Bouvieret
Ronen Brafman
Ivan Bratko
Ulf Brefeld
Robert Busa-Fekete
Reynold C.K. Cheng
Pedro Cabalar
Elena Cabrio
Deng Cai
Ruichu Cai
Diego Calvanese
Xiangyong Cao
Tran Cao Son
Ioannis Caragiannis
Claire Cardie
Jaime Cardoso
Pablo Castells
Tristan Cazenave
Michelangelo Ceci
Jesus Cerquides
Amedeo Ceci
Joyce Chai
Antoni Chan
Manmohan Chandraker
Shiyu Chang
Gal Chechik
Rama Chellappa
Wei Chen
Badong Chen
Li Chen
Ning Chen
Weiwei Cheng
William K. Cheung
Yann Chevaleyre
Sung-Bae Cho
Arthur Choi
Berthe Y Choueiry
Alexandra Chouldechova
Fu-lai Chung
Charles Clarke
Cristina Conati
Martin Cooper
Fabio Cozman
Hamed Pirsiavash
Thomas Ploetz
Massimo Poesio
David Poole
Leonard Poon
Soujanya Poria
Luigi Portinale
Pascal Poupart
Henri Prade
Henry Prakken
Alun Preece
Valentina Presutti
Guo-Jun Qi
Yanjun Qi
Yu Qiao
Tao Qin
Venkatesh Babu Radhakrishnan
Alain Rakotomamonjy
Ganesh Ramakrishnan
Srikan Ramalingam
Sarvapali Ramchurn
Visvanathan Ramesh
Jan Ramon
Nalini Ratha
Balaraman Ravindran
Paul Rayson
Jesse Read
Chris Reed
Roi Reichart
Jochen Renz
Marcello Restelli
Elisa Ricci
Peter Richtarik
Mark Riedl
Fabrizio Riguzzi
Jussi Rintanen
Alan Ritter
CÃ©line Robardet
Manuel Gomez Rodriguez
Gabriele Röger
Lior Rokach
Fred Roosta
Riccardo Rosati
Michal Rosen-Zvi
Avi Rosenfeld
Jeffrey S. Rosenschein
Francesca Rossi
Paolo Rosso
Jörg Rothe
Tim Roughgarden
Michael Rovatsos
Leonel Rozo
Sebastian Rudolph
Salvatore Ruggieri
Wheeler Ruml
Alessandra Russo
RÃ©gis Sabbadin
Ashish Sabharwal
Domenico Saccà
Norman Sadah
Fariba Sadri
Horacio Saggion
Antonio Salmeron
Jitao Sang
Sriram Sankararaman
Scott Sanner
Sunita Sarawagi
Torsten Schaub
Matthias Scheutz
Steven Schockaert
Marc Schoenaer
Marco Schorlemmer
Hannes Schulz
Roberto Sebastiani
Joan Serra
Giuseppe Serra
Yuval Shahar
Caifeng Shan
Bracha Shapira
Ehud Shapiro
Onn Shehory
Yi-Dong Shen
Victor Sheng
Yuhui Shi
Solomon Eyal Shimony
Ilan Shimshoni
Gerardo Simari
Guilleremo Simari
Reid Simmons
Laurent Simon
Vikas Sindhwani
Christine Sinoquet
Elizabeth Sklar
Aleksands Slivkins
Shirin Sohrabi
Mingli Song
Leandro Soriano Marcolino
Daby Sow
Matthijs T. J. Spaan
Richard Sproat
Vivek Srikumar
Kavitha Srinivas
Biplav Srivastava
Mudhakar Srivatsa
Giorgos Stamou
Mark Steedman
Umberto Straccia
Heiner Stuckenschmidt
Peter Stuckey
Nathan Sturtevant
Hang Su
I. Venkata Subramaniam
Masashi Sugiyama
Changho Suh
Gita Sukthankar
Zhenan Sun
Ron Sun
Xiaoyan Sun
Katia Sycara
Panagiotis Symeonidis
Zhaoxiang Zhang
Yi Zhang
Kai Zhang
Xiaofeng Zhang
Min Zhang
Dongmo Zhang
Jiajun Zhang
Xiangliang Zhang
Yue Zhang
Rui Zhang
Zhongfei Zhang
Min-Ling Zhang
Jie Zhang
Yu Zhang
Jun Zhao
Qi Zhao
Liang Zheng
Wei-Shi Zheng
Ding-Xuan Zhou
Wengang Zhou
Jun Zhu
Hongtu Zhu
Hankz Hankui Zhuo
Roie Zivan
Aviv Zohar
Ingrid Zukerman
Blaz Zupan

Program Committee Members

John A. Doucette
Zahraa Abdallah
Talel Abdessalem
Mohammad Abdulaziz
Mara Abel
Rui Abreu
Pedro Henriques Abreu
Erman Acar
Silvana Aciar
Carole Adam
Alessandro Adamou
Yossi Adi
Stergos Afantenos
Swapna Agarwal
Sumeet Agarwal
Zeljko Agic
Nesreen Ahmed
Marc Aiguier
Stephane Ariaia
Thalaiyasingam Ajanthan
Charilaos Akasiadis
Baris Akgun
Özgür Akgün
Rabah Al-Zaidy
Ibrahim Alabdulmohsin
Mehwish Alam
Michael Albert
Marco Alberti
Alexandre Albore
Enrique Marcelo Albornoz
Lyuba Alboul
Stefano Albrecht
David Albrecht
Huib Aldeokerl
Ron Alford
Shaull Almagor
Jose Alonso
Miguel Alonso
Dalal Alrajeh
Klaus-Dieter Althoff
Mario Alviano
Sofia Amador Nekle
Georgios Amanatidis
Antoine Amarilli
Frédéric Amblard
Maxime Amblard
Giovanni Amendola
Ofra Amir
Le An
Prasanth Anbalagan
Davide Ancona
David Andrzejewski
Claudio Angione
Davide Anguita
Luca Anselma
Luiza Antonie
Alessandro Antonucci
Xiang Ao
Prathosh Ap
Sachiyo Arai
Ricardo Araujo
Athirai Aravazhi Irissappane
Chris Archibald
Liliana Ardissono
Carlos Areces
Ofer Arieli
Marcelo G. Armentano
Alessandro Artale
Thierry Artieres
Christian Artigues
Alexander Artikis
Vijay Arya
Masatomo Asai
Umar Asif
Manuel Atencia
Awais Athar
Martin Atzmueller
Mathieu d'Aquin
Thomas Augustin
Guy Avni
Edmond Awad
Reyhane Aydogan
Amar Prakash Azad
Amos Azaria
Amadou Ba
Yukino Baba
Behrouz Babaki
Rohit Babbar
Davide Bacciu
Kerstin Bach
Shengfeng He
Ruifang He
Xiao He
Di He
Luheng He
Shizhu He
Kun He
Jennifer Healey
Chinmay Hegde
Mattias Heinrich
Fredrik Heintz
Aron Henrikkson
Rui Henriques
Carlos Hernandez
Daniel Hernandez Lobato
Pablo Hernandez-Leal
Jose Hernandez-Orallo
Marijn Heule
Ryuichiro Higashinaka
Khalil El Hindi
Koen Hindricks
Roberto Hirata Jr
Gabriel Hjort Blindell
Brahim Hnich
Clint Chin Pang Ho
Edmond S. L. Ho
Nghia Hoang
Michael Hofbaur
Chris Holmes Parker
Arjen Hommersom
Jun Hong
Yu Hong
Wenjing Hong
Amy Hoover
Hykel Hosni
Hadi Hosseini
Chenping Hou
Junhui Hou
Ping Hou
Thomas Howard
Kuang-Jui Hsu
Jane Hsu
Guosheng Hu
Liang Hu
Wenbin Hu
Juhua Hu
Yao Hu
Han Hu
Zehong Hu
Yang Hua
Sheng-Jun Huang
Wenbing Huang
Feihu Huang
Chao Huang
Xin Huang
Han Huang
Jin Huang
Wenyi Huang
Qiming Huang
Xiaowei Huang
Guoquan Huang
Guoping Huang
Kaizhu Huang
Kejun Huang
Zengfeng Huang
Jing Huang
Jiaji Huang
Weilin Huang
Shujian Huang
Junshi Huang
Marie-José Huguett
Yuk Hui
Aaron Hunter
Zhouyuan Huo
Guillaume Hutzler
Sung Ju Hwang
Antti Hyvärinen
Giovambattista Ianni
Yazmin Ibáñez-García
Rasmus Ibsen-Jensen
Tsuyoshi Ide
Nancy Ide
Dino Ienco
Georgiana Iirrim
Ayumi Igashiri
Roberto Iglesias Rodriguez
Alexey Ignatiev
Hiroyuki Iida
Takashi Ikegami
Takashi Imamichi
Kenji Imamura
Hiroshi Inoue
Mohammad Irfan
Go Irie
Anisse Ismaili
Vamsi Ithapu
Magdalena Ivanovska
Yusuke Iwasawa
Said Jabbour
Brijnesh Jain
Arjun Jain
Mahdi Jallili
Shoaib Jameel
Kevin Jamieson
Wojciech Jamroga
Jean-Christophe Janodet
Jingyuan Janodet
Mikolas Janota
Szymon Jaroszewicz
Laurent Jeanpierre
Christopher Jefferson
David Jensen
Baptiste Jeudy
Yangfeng Ji
Pan Ji
Jianmin Ji
Xiuyi Jia
Jia Jia
Zhuolin Jiang
Jie-Hong Jiang
Xiaorui Jiang
Yurong Jiang
Albert Xin Jiang
Guifei Jiang
Shuqiang Jiang
Hua Jiang
Jing Jiang
Xueyan Jiang
Meng Jiang
Tingting Jiang
Shali Jiang
Biao Jie
Sergio Jimenez Celorrio
Ernesto Jimenez-Ruiz
Xiaoming Jin
Cheng Jin
Xiaolong Jin
Yan Jin
Di Jin
Bo Jin
Zhongming Jin
Wei Jin
Xiao-Yuan Jing
Ulf Johansson
Nicholas Johnson
Arne Jönsson
Nicolas Jouandeau
Brendan Juba
Vicente Julian
Perez Julien
Kwang-Sung Jun
Jean Christoph Jung
Ulrich Junker
Tommi Junttila
Anna Jurek-Loughrey
Preethi Jyothi
Ata Kaban
Souhila Kaci
Serdar Kadioglu
Rudolf Kadlec
Leslie Kaebbling
Ozgur Kafali
Samira Kahou
Hermann Kaindl
Nobuhiro Kaji
Antonis Kakas
Cezary Kaliszyn
Dimitris Kalles
Rossi Kamal
Vijay Kamble
Roger Kameugne
Hidetaka Kamigaito
Mark Kaminski
Toshihiro Kamishima
Meina Kan
Ryo Kanamori
Takafumi Kanamori
Pallika Kanani
Panagiotis Kanellopoulos
Zhao Kang
Iyad Kanj
Jean-Daniel Kant
Purushottam Kar
Ioannis Karamouzas
Nikos Karanikolas
Masayuki Karasuyama
Isak Karlsson
Andreas Karwath
Samuel Kaski
Ioannis Katakis
Mike Katchabaw
George Katsirelos
Takayuki Katsuki
Gilad Katz
Nikos Katzouris
Daisuke Kawahara
Hidenori Kawamura
Yasushi Kawase
Mehdi Kaytoue
Thomas Keller
Einat Kermany
Emil Keyder
Shehroz Khan
Mohammad Emtyiaz Khan
Bishesh Khanal
Piyush Khandelwal
Rajiv Khanna
Tushar Khot
Udayan Khurana
Stanislav Kikot
Philip Kilby
Saehoon Kim
Doo Soon Kim
Kee-Eung Kim
Tae Hyun Kim
Angelika Kimmig
Svetlana Kiritchenko
Akihiro Kishimoto
Zeynep Kiziltan
Günter Klambauer
Arto Klami
William Klement
Tomas Kliegr
Max Klimm
Franziska Klügl
Matthias Klusch
Peter Knees
Matthias Knorr
Alistair Knott
Murat Kocaoglu
Dragi Kocev
Uwe Köckemann
Anders Kofod-Petersen
Roxane Koitz-Hristov
Stanley Kok
Nadin Kokciyan
Fotis Kokkoras
Martin Kollingbaum
Mamoru Komachi
Christian Komusiewicz
Yuxin Peng
Chengbin Peng
Jing Peng
Wen-Chih Peng
Xi Peng
Xi Peng
Pavlos Peppas
André Grahil Pereira
Giuseppe Perelli
Guillaume Perez
Diego Perez Liebana
Adriano Peron
Mathieu Perrot
Laurent Perrussel
Georgios Petasis
Ron Petrick
Alexander Peysakhovich
David Pfau
Nghia Pham
Nhathai Phan
Dzung Phan
Chiara Piacentini
Carla Piazza
Gauthier Picard
Sebastien Picault
Reinhard Pichler
Frédéric Pichon
Fabio Pierazzi
Andreas Pieris
Basile Pierpaolo
Cédric Piette
Martin Pilát
Ingo Pill
Sophie Pinchinat
Carlo Pinciroli
Wang Pinghui
Ramon Pino-Perez
Jervis Pinto
Gianvito Pio
Giuseppe Pirrò
Roberto Pirrone
Silviu Pitis
Jordi Planes
Marc Plantevit
Antonella Poggi
Sylvia Polberg
Nicola Policella
Axel Polleres
Adriano Polpo
Maria Polukarov
Florian Pommerening
Denis Ponomaryov
Fabrice Popineau
Daniele Foredllo
Julie Porteous
David Portugal
Nico Potyka
Forough Poursabzi-Sandgeh
Gian Luca Pozzato
Cédric Pralet
Ronaldo Prati
Steve Prestwich
Alberto Pretto
Mike Preuss
Philippe Preux
Alessandro Previti
Carlo Proietti
Ricardo Prudencio
Jay Pujara
Jaime Pulido Fentanes
Luca Pulina
Sanjay Purushotham
Rami Puzis
Yu Qi
Guilin Qi
Qi Qian
Xiaoming Qian
Xueming Qian
Tieyun Qian
Chao Qian
Maoying Qiao
Linbo Qiao
Yu Qiao
Miao Qiao
Xiangju Qin
Zengchang Qin
Shengchao Qin
Tony Qin
Likun Qin
Weichao Qiu
Xipeng Qiu
Minghui Qiu
Peiyong Qu
Xiaojun Quan
Brian Quanz
Qichao Que
Luis Quesada
Claude-Guy Quimper
Alejandra Quiros Ramirez
Matias Quiroz
Jacob R. Gardner
Zinovi Rabinovich
Guillaume Rabusseau
Emmanuel Rachelson
Goran Radanovic
Dimitrios Rafailidis
Tahrima Rahman
Hossein Rahmani
Franco Raimondi
Vaibhav Rajan
Abdur Rakib
Liva Ralaiwola
Parikshit Ram
Subramanian Ramamoorthy
Heri Ramampiaro
Maya Ramanath
Arti Ramesh
Karinne Ramirez-Amaro
Joseph Ramsey
Riccardo Rasconi
Irma Ravkic
Oliver Ray
Veselin Raychev
Rudy Raymond
Ivan Razo-Zapata
Anna Helena Reali Costa
Christoph Redl
Khaled Refaat
Ioannis Refanidis
Jean-Charles Regin
Mauricio Reis
Sekou Remy
Shaogang Ren
Zhou Ren
Dongwei Ren
Yongli Ren
Fenghui Ren
Andrea Rendl-Pitrey
Gavin Rens
Chiara Renso
Valerio Restocchi
Achim Rettinger
Kate Revoredo
Mark Reynolds
Md Reza
Francesco Ricca
Giuseppe Riccardi
Alessandro Ricci
Ariella Richardson
Florian Richoux
Kai-Florian Richter
Patricia Riddle
Luke Riley
Fabien Ringeval
Matteo Riondato
Petar Ristoski
Ettore Ritacco
Mark Roberts
Valentin Robu
Mathieu Roche
Odinaldo Rodrigues
Sebastian Rodriguez
Ricardo Rodriguez
Oscar Rodriguez-Rocha
Camino Rodriguez-Vela
Gemma Roig
Mauro Roisenberg
Haggai Roitman
Andrea Roli
Emma Rollon
Salvatore Romeo
Oscar J. Romero
Pedram Rooshenas
Ribana Roscher
Ariel Rosenfeld
Sara Rosenthal
Christopher Rosin
Marco Rospocher
Silvia Rossi
Roberto Rossi
Ryan Rossi
Julien Rossit
Constantin Rothkopf
Antonino Rotolo
Hans Rott
Olivier Roussel
Marie-Christine Rousset
CÃ©line Rouveirl
Marco Roveri
Shourya Roy
Sandipan Roy
Subhrajit Roy
Aurko Roy
Alessandro Rozza
Wenjie Ruan
Jonathan Rubin
Sasha Rubin
Zachary Rubinstein
Hana Rudová
Hugo Leonardo Rufner
Anna Rumshisky
Nicholas Ruozzi
Zalila-Wenkstern Rym
Vladislav Ryzhikov
Jordi Sabater-Mir
David Sabel
Nicolas Sabouret
Orkunt Sabuncu
Mehdi Sadeqi
Aleksander Sadikov
Alessandro Saetti
Abdallah Saffidine
Ramon Sagarna
Sriparna Saha
Ankan Saha
Diptikalyan Saha
Patrick Saint Dizier
Lakhdar Sais
Hassan Sajjad
Chiaki Sakama
Ilias Sakellariou
Jun Sakuma
Frederic Sala
Pietro Sala
Albert Ali Salah
Amirali Salehi-Abari
Yakoub Salhi
Miguel A. Salido
Flora Salim
Robert Salomone
Oren Salzman
Mark Sammons
Daniel Sánchez
Luis Sanchez Fernandez
Victor Sanchez-Anguix
Antonio A. Sánchez-Ruiz
Anush Sankaran
Fernando Santos
José Santos
Vitor Santos Costa

lxxxvi
Ario Santoso
Ismael Sanz
Oren Sar Shalom
Somdeb Sarkhel
Kanthi Sarpatwar
Giovanni Sartor
Claudio Sartori
Ravi Kiran Sarvadevabhatla
Yutaka Sasaki
Ryohel Sasano
Saket Sathe
Shin'ichi Satoh
Abdul Sattar
Thomas Sauerwald
Domenico Fabio Savo
Enrico Scala
Marco Schaefer
Pierre Schaus
Silvia Schiaffino
Claudio Schiffanella
Frank-Michael Schleif
Stefan Schlobach
Jan Schlüter
Ute Schmid
Renate Schmidt
Thomas Schneider
Lutz Schröder
Matthias Schubert
Johan Schubert
Christian Schulte
Carl Schultz
Claudia Schulz
Michael Ignaz Schumacher
François Schwarzentruber
Christoph Schreiering
Chris Schwegelshohn
Nicolas Schwind
Rolf Schwitter
Guido Sciacco
Stephen Scott
Laura Sebastia
Pascale Sébillot
Karima Sedki
Erel Segal-halevi
Martina Seidl
Jendrik Seipp
Shreyas Sekar
Meinolf Sellmann
Luciano Serafini
Ivan Serina
Edoardo Serra
Mathieu Serrurier
Baris Sertkaya
Lorenzo Severini
Mein Sekin
Nisarg Shah
Paulo Shakarian
Huasong Shan
Shuo Shang
Chao Shang
Fanhua Shang
Junming Shao
Yingxia Shao
Ming Shao
Avinash Sharma
Dr. Mansi Sharma
Or Sheffer
Haifeng Shen
Furao Shen
Yanyan Shen
Yiru Shen
Xiaobo Shen
Huawei Shen
Yinghuan Shi
Baoguang Shi
Jun Shi
Motoki Shiga
Nobuyuki Shimizu
Solomon Eyal Shimony
Masamichi Shimosaka
Hiroaki Shiokawa
Yaniv Shmueli
Michal Shmueli-Scheuer
Anshumali Shrivastava
Xiangbo Shu
Hai Shu
Mohamed Siala
Silvan Sievers
Sujoy Sikdar
Ricardo Silveira
Jakub Simko
Mantas Simkus
Sunil Simon
Gilles Simonin
Olivier Simonin
Mor Sinay
Sudhanshu Singh
Munindar Singh
Dhirendra Singh
Ambuj Singh
Adish Singla
Arunesh Sinha
Carsten Sinz
Michael Sioutis
Oskar Skibski
Piotr Skowron
Marija Slavkovik
Amy Sliva
Friedrich Slivovsky
Kevin Small
Sonja Smets
Stephen F. Smith
Adam Smith
Mark Snaith
Lauro Snidaro
Sam Snodgrass
Eric Sodomka
Leen-Kiat Soh
Harold Soh
Kyung-Ah Sohn

lxxxvii
<table>
<thead>
<tr>
<th>Lina Yao</th>
<th>Feifei Zhai</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yuan Yao</td>
<td>Kun Zhan</td>
</tr>
<tr>
<td>Yazhou Yao</td>
<td>Lei Zhang</td>
</tr>
<tr>
<td>Andrew Yates</td>
<td>Shuai Zhang</td>
</tr>
<tr>
<td>Qixiang Ye</td>
<td>Quanshi Zhang</td>
</tr>
<tr>
<td>Han-Jia Ye</td>
<td>Hao Zhang</td>
</tr>
<tr>
<td>Meng Ye</td>
<td>Chiyuan Zhang</td>
</tr>
<tr>
<td>Nan Ye</td>
<td>Chao Zhang</td>
</tr>
<tr>
<td>Mao Ye</td>
<td>Jiulian Zhang</td>
</tr>
<tr>
<td>Yanfang Ye</td>
<td>Zizhao Zhang</td>
</tr>
<tr>
<td>Hao Ye</td>
<td>Xiao-Yu Zhang</td>
</tr>
<tr>
<td>Peter Yeh</td>
<td>Jiawei Zhang</td>
</tr>
<tr>
<td>Mi-Yen Yeh</td>
<td>Yuanlin Zhang</td>
</tr>
<tr>
<td>Roi Yehoshua</td>
<td>Lu Zhang</td>
</tr>
<tr>
<td>Reyyan Yeniterzi</td>
<td>Hanwang Zhang</td>
</tr>
<tr>
<td>Kyongmin Yeo</td>
<td>Ziming Zhang</td>
</tr>
<tr>
<td>William Yeh</td>
<td>Yongfeng Zhang</td>
</tr>
<tr>
<td>Wenzhen Yin</td>
<td>Meishan Zhang</td>
</tr>
<tr>
<td>Yichun Yin</td>
<td>Wei Zhang</td>
</tr>
<tr>
<td>Hongzhi Yin</td>
<td>Shilei Zhang</td>
</tr>
<tr>
<td>Haiyan Yin</td>
<td>Zongzhang Zhang</td>
</tr>
<tr>
<td>Junfu Yin</td>
<td>Zhihong Zhang</td>
</tr>
<tr>
<td>Zhijun Yin</td>
<td>Weinan Zhang</td>
</tr>
<tr>
<td>Ming Yin</td>
<td>Wei Zhang</td>
</tr>
<tr>
<td>Shihui Ying</td>
<td>Lefei Zhang</td>
</tr>
<tr>
<td>Xiaowei Ying</td>
<td>Yutting Zhang</td>
</tr>
<tr>
<td>Yiming Ying</td>
<td>Sixin Zhang</td>
</tr>
<tr>
<td>Logan Yliniemi</td>
<td>Xu-Yao Zhang</td>
</tr>
<tr>
<td>Neil Yorke-Smith</td>
<td>Zhenjie Zhang</td>
</tr>
<tr>
<td>Koichiro Yoshino</td>
<td>Shengyu Zhang</td>
</tr>
<tr>
<td>Takayuki Yoshizumi</td>
<td>Zhao Zhang</td>
</tr>
<tr>
<td>Shan You</td>
<td>Qi Zhang</td>
</tr>
<tr>
<td>Jianfei Yu</td>
<td>Weizhong Zhang</td>
</tr>
<tr>
<td>Peng Yu</td>
<td>Yinqian Zhang</td>
</tr>
<tr>
<td>Lei Yu</td>
<td>Peng Zhang</td>
</tr>
<tr>
<td>Christina Lee Yu</td>
<td>Jiji Zhang</td>
</tr>
<tr>
<td>Chao Yu</td>
<td>Richong Zhang</td>
</tr>
<tr>
<td>Xiaotian Yu</td>
<td>Changqing Zhang</td>
</tr>
<tr>
<td>Yi Yu</td>
<td>Fenggan Zhang</td>
</tr>
<tr>
<td>Wenjian Yu</td>
<td>Teng Zhang</td>
</tr>
<tr>
<td>Guoxian Yu</td>
<td>Wei Emma Zhang</td>
</tr>
<tr>
<td>Zhengtao Yu</td>
<td>Meng Zhang</td>
</tr>
<tr>
<td>Yintao Roger Yu</td>
<td>Liyan Zhang</td>
</tr>
<tr>
<td>Zhou Yu</td>
<td>Xiaowang Zhang</td>
</tr>
<tr>
<td>Kaixian Yu</td>
<td>Debing Zhang</td>
</tr>
<tr>
<td>Shuhan Yuan</td>
<td>Dongyu Zhang</td>
</tr>
<tr>
<td>Se Young Yun</td>
<td>Jingyang Zhang</td>
</tr>
<tr>
<td>Jure Zabkar</td>
<td>Zhiwei Zhang</td>
</tr>
<tr>
<td>Fouad Zablith</td>
<td>Junbo Zhang</td>
</tr>
<tr>
<td>Amir Zadeh</td>
<td>Xingxing Zhang</td>
</tr>
<tr>
<td>Siamak Zamani Dadaneh</td>
<td>Jianjia Zhang</td>
</tr>
<tr>
<td>Anna Zamansky</td>
<td>Shiliang Zhang</td>
</tr>
<tr>
<td>Franco Zambonelli</td>
<td>Yanming Zhang</td>
</tr>
<tr>
<td>Marcos Zampieri</td>
<td>Anru Zhang</td>
</tr>
<tr>
<td>Marina Zanella</td>
<td>Shichao Zhang</td>
</tr>
<tr>
<td>Fabio Massimo Zanzotto</td>
<td>Chao Zhang</td>
</tr>
<tr>
<td>Haifa Zargayouna</td>
<td>Si Zhang</td>
</tr>
<tr>
<td>Benjamin Zarrieß</td>
<td>Bao Zhang</td>
</tr>
<tr>
<td>Gerson Zavretucha</td>
<td>Jun Zhang</td>
</tr>
<tr>
<td>Riccardo Zese</td>
<td>Yu Zhang</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reviewers

Xavier Alameda-Pineda
Idan Achituve
Hassan Ashtiani
Miguel Ballesteros
Udi Barzelay
Chris Beck
Mustafa Bilgic
Marlos C. Machado
Minhao Cheng
Colin Cherry
Eric Chi
Stephen Clark
Oana Cocarascu
Gianni Costa
Christos Dimitrakakis
Trong Dinh Thac Do
Florence Dupin de Saint-Cyr
Ad Feelders
Miriam Fernandez
Romaric Gaudel
Thierry Géraud
Moojan Ghafurian
Shahriar Hossain
Xia Hu
Yonggang Huang
Michael Hughes
Eyke Hüllermeier
William Jarrold
Melih Kandemir
Sami Khenissi
Olivera Kotevska
Meelis Kull
Cuiling Lan
Kfir Levy
Xiaopeng Li
Yen Yu Lin
Marius Lindauer
Kai Liu
Lingqiao Liu
Xuanqing Liu
Eneldo Loza Mencia
Wenpeng Lu
Henri Maître
Oren Melamud
Brian Milch
Makoto Miwa
Leora Morgenstern
Saketha Nath
Bernhard Nessler
Nicolas Passat
Michael Perrot
Matteo Pirotta
Alex Polozov
Rui Prada
Elodie Puybareau
Hanan Rosemarin
Benjamin Rosman
Sivan Sabato
Elad Sarafian
Michele Sebag
Pedro Sequeira
Zahra Sheikbahaee
Mor Sinay
Yi-Zhe Song
Ameet Soni
Ichigaku Takigawa
Fei Tian
Thomas Unterthiner
Yoshitaka Ushiku
Jack Valmadre
Huijuan Wang
Shoujin Wang
Hui Wu
Martha White
Lingxi Xie
Florian Yger
Wang Yifei
Albrecht Zimmermann

Ben Abramowitz
Faez Ahmed
Mahtab Ahmed
Vidal Alcazar
Sarah A. Alkhodair
Mohammed Almukaynizi
Malik Altakrori
Hamidreza Alvari
Medina Andresel
Noureddine Alvari
Francesco Barile
Michael Barz
Gregor Behnke
Aimene Belfodil
Charley Beller
Diana Benavides-Prado
Anes Bendimerad
Vladimir Berikov
Yann Bernard
Jasmin Bogatinovski
Christian Cesar Bones
AnneMarie Borg
Robert Bossy
Stephen Boxwell
Laura Bozzelli
Haya Brama
Andrea Brunello
Gino Brunner
Filippo Cantucci
Valentin Cassano
Taha Ceriti
Jesus Cerquides
Rohan Chandra
Tristan Charrier
Bapi Chatterjee
Alexander Chatzigeorgiou
Shaowei Chen
Yu Chen
Jiaoyan Chen
Ting Chen
Pin-Yu Chen
Kaixuan Chen
Zhourong Chen
Peihao Chen
Leena Chennuru Vankadara
Fedrero Corò
Augusto B. Corrêa
Michael Curry
Bernardo Cuteri
Alessandro Daniele
Ramiro Demasi
Alexander Demin
Chiara Di Francescomarino
Steven H. H. Ding
Shaojin Ding

**Review Assistants**

Ralph Abboud
Maryam Abdolali
Kumar Abhishek
Haluk Dogan
Ivan Donadello
Huimin Dong
Thomas Dopierre
Mehdi Elahi
Salomé Eriksson
Daniele Evangelista
Marco Faella
Joachim Fainberg
Lifeng Fan
Le Fang
Gabriele Farina
Kevin Fauvel
Patrick Ferber
Manuel Fernandez-Carmona
Arnaud Ferré
Joao F. Ferreira
Matthias Fey
Tanner Fiez
Marcelo Finger
Adrien Fois
Luca Franceschi
Santiago Franco
Pedro Freitas
Edoardo Galimberti
Jiarui Gan
Tianyu Gao
Javier Garcia
Noa Garcia
Benoît Gauzere
Cédric Geissmann
Anne-Marie George
Daniel Gilbert
Nicola Gigante
Nicolas Gontier
Palash Goyal
Massimo Guarascio
Jean-Luc Guérin
Quan Guo
Victor Guthiérez-Basulto
Zeynep Hakguder
Haraldur Hallgrímsson
Jiyeon Han
Fangqiu Han
Li Haoliang
Adrian Haret
Matthew Hausknecht
Zhicheng He
Romain Herault
Jesse Heyninck
Julia Hirschberg
Minh Hoang
Tobias Hogrebe
Daniel Höller
Shenda Hong
Ridi Hossain
Angelo Impedovo
Marco Imperoli
Fabricio Inácio
Roberto Interdonato
Alexander Ivrii
Alon Jacovi
Ankit Jalan
Itissier Itissier
Jean Christoph Jung
Andrzej Kaczmarszyk
Rushang Karia
Graham Katz
Yevgeny Kazakov
Shakila Khan Rumi
Benjamin Kiesl
Dominik Klein
Furkan Kocayusufoglu
Vid Kocijan
Daniel Kotke
Paraskevas Koukaras
Vaclav Kratochvil
Kalliopi Kravari
Madhavan Krishnan
Ayse Kucukyilmaz
Varun Kumar
Alasdair Lambert
Dominik Lang
Javier Larrosa
Joshua Lau
Luca Laurenti
Pierre Le Bodic
Yahia Lebbah
Piyawat Lertvittayakumjorn
Jundong Li
Na Li
Weihua Li
Jiaoyang Li
Zhihui Li
Qingyang Li
Dawei Li
Yandong Li
Miles Li
Cong Li
Kar Wai Lim
Paichun Lin
Jonathan Liono
Zhinig Liu
Boyang Liu
Fábio Lobato
Juan Antonio Lossio-Ventura
Eneldo Loza Mencia
Xiaoxuan Lu
Guangquan Lu
Wenhan Luo
IJCAI'19 Demos Program Committee

Ewa Andrejczuk (Nanyang Technological University)
Athirai Aravazhi Iriissappane (University of Washington Tacoma)
Bernhard Bauer (University of Augsburg)
Vaishak Belle (University of Edinburgh)
Lars Braubach (University of Applied Sciences Bremen)
Nils Bulling (TU Clausthal)
Zhiguang Cao (National University of Singapore)
Sujoy Chatterjee (University of Cote d’Azur)
Shuo Chen (Nanyang Technological University)
David Chin (University of Hawaii)
Stephen Cranefield (University of Otago)
Hoa Dam (University of Wollongong)
Yves Demazeau (Centre National de la Recherche Scientifique (CNRS))
Minh Do (NASA Ames Research Center)
Hui Fang (Shanghai University of Finance and Economics)
Jelena Fiosina (Clausthal University of Technology)
Maksims Fiosins (German Center for Neurodegenerative Diseases (DZNE))
Matjaz Gams (Jozef Stefan Institute)
Qing Guo (Nanyang Technological University)
Kamalakar Karlapalem (IIIT Hyderabad)
Jeffrey Kephart (IBM Research)
Akihiro Kishimoto (IBM Research)
Franziska Klügl (Örebro University)
Daniel Kudenko (University of York)
Sebastien Lalle (University of British Columbia)
Kate Larson (University of Waterloo)
Joao Leite (Universidade NOVA de Lisboa)
Xiaoming Li (Nanyang Technological University)
Zelei Liu (Jilin University)
Yong Liu (Nanyang Technological University)
Brian Logan (University of Nottingham)
Chong Long (Ant Financial Group)
Thibaut Lust (Sorbonne Université)
Nicholas Mattei (Tulane University)
Nir Oren (University of Aberdeen)
Weike Pan (Shenzhen University)
Andrea Passerini (University of Trento)
Andrew Perrault (University of Southern California)
Francois Schwarzentruber (ENS Rennes)
Onn Shehory (Bar Ilan University)
Wen Song (Nanyang Technological University)
Matthijs Spaan (Delft University of Technology)
Zhu Sun (Nanyang Technological University)
Ingo J. Timm (Trier University)
Alvaro Torralba (Saarland University)
Paolo Torroni (University of Bologna)
M. Birna van Riemsdijk (University of Twente)
Julien Velcin (Université Lyon 2)
Bao Vo (Swinburne University of Technology)
Jiri Vokrinek (Czech Technical University in Prague)
Chang-Dong Wang (Sun Yat-sen University)
Yang Wang (University of Technology Sydney)
Xiguang Wei (WeBank)
Paul Weng (Shanghai Jiao Tong University)
Michael Winikoff (University of Otago)

Qiong Wu (Nanyang Technological University)
Pengwei Xing (Tianjin University)
Chang Xu (CSIRO Data61)
Yue Xu (Queensland University of Technology)
Nitin Yadav (University of Melbourne)
Han Yu (Nanyang Technological University)
Franco Zambonelli (Università di Modena e Reggio Emilia)
Qianru Zhang (The University of Hong Kong)
Xin Zhou (Nanyang Technological University)
IJCAI-19 Sponsorship

Main Sponsor
Sony

Diamond
Xiaoi
Baidu
Huawei
Artificial Intelligence Journal

Platinum
Tencent
Didi ChuXing
Squirrel AI Learning
Virtual Lindang Development Center

Gold
Lenovo Big Data
Openbayes

WeBank
IBM Research AI
ICE Kredit
Ali Baba Group

Silver
Prowler.io
Bosch
Jane Street
Hitachi
Tongdun

Bronze
Laiye
Micorosoft

Industry day
PWC

Awards and Distinguished Reviewers

The IJCAI-19 Award for Research Excellence, the John McCarthy Award and the Computers and Thought Award are awarded by the IJCAI Board of Trustees, upon recommendation by the IJCAI-19 Awards Selection Committee, which consists this year of:

- Marie des Jardins, University of Maryland, Baltimore County (USA)
- Sarit Kraus, Bar-Ilan University (ISRAEL)
- Dan Roth, The Beckman Institute, University of Illinois at Urbana-Champaign (USA)
- Carles Sierra, Artificial Intelligence Research Institute (IIIA) (SPAIN)
- Michael Wooldridge, (Chair), Oxford University (UK)

The IJCAI Awards Selection Committee receives advice from members of the IJCAI-19 Awards Review Committee, who comment on the accuracy of the nomination material and provide additional information about the nominees. The IJCAI-19 Awards Review Committee is the union of the former Trustees of IJCAI, the IJCAI-19 Advisory Committee, the Program Chairs of the last three IJCAI conferences, and the past recipients of the IJCAI Award for Research Excellence and the IJCAI Distinguished Service Award, with nominees excluded.

IJCAI 2019 Award for Research Excellence

The winner of the 2019 Award for Research Excellence is Yoav Shoham, Professor of Computer Science at Stanford University. Professor Shoham is recognized for contributions to knowledge representation, multi-agent systems, and the economic foundations of AI.

The Research Excellence award is given to a scientist who has carried out a program of research of consistently high quality throughout an entire career yielding several substantial results.

**IJCAI 2019 Computers and Thought Award**

The winner of the 2019 IJCAI Computers and Thought Award is Guy Van den Broeck , Assistant Professor and Samuei Fellow at UCLA. Professor Van den Broeck is recognized for his contributions to statistical and relational artificial intelligence, and the study of tractability in learning and reasoning.

The Computers and Thought Award is presented at IJCAI conferences to outstanding young scientists in artificial intelligence. The award was established with royalties received from the book, Computers and Thought, edited by Edward Feigenbaum and Julian Feldman. It is currently supported by income from IJCAI funds.


**IJCAI 2019 John McCarthy Award**

The winner of the 2019 John McCarthy Award is Pedro Domingos, Professor at the University of Washington. Professor Domingos is recognized for contributions to machine learning and data science, and to unifying logic and probability.

The IJCAI John McCarthy Award is intended to recognize established mid-career researchers, typically between fifteen to twenty-five years after obtaining their PhD, that have built up a major track record of research excellence in artificial intelligence. Nominees of the award will have made significant contributions to the research agenda in their area and will have a first-rate profile of influential research results.

The award is named for John McCarthy (1927-2011), who is widely recognized as one of the founders of the field of artificial intelligence. As well as giving the discipline its name, McCarthy made fundamental contributions of lasting importance to computer science in general and artificial intelligence in particular, including time-sharing operating systems, the LISP programming languages, knowledge representation, common-sense reasoning, and the logicist paradigm in artificial intelligence. The award was established with the full support and encouragement of the McCarthy family.

Past recipients of this honor have been: Bart Selman (2015), Moshe Tennenholtz (2016), Dan Roth (2017) and Milind Tambe (2018).

**IJCAI 2019 Donald E. Walker Distinguished Service Award**

The IJCAI Distinguished Service Award 2019 winner is Francesca Rossi, Professor of Computer Science at the University of Padova, Italy, and Distinguished Research Staff Member of IBM Research, where she is the AI Ethics Global Leader. Professor Rossi is recognized for her substantial contributions, as well as her extensive service to the field of Artificial Intelligence in various roles throughout her career.


**IJCAI 2019 Minsky Medal**

The Marvin Minsky Medal for Outstanding Achievements in AI is named for Marvin Minsky (1927-2016), one of the founders of the field of AI; the award was initiated with the full support of the Minsky family in 2018.

The inaugural Minsky Medal was awarded in 2018 to the AlphaGo team. The second Marvin Minsky Medal is awarded to the team behind Libratus, led by Prof. Tuomas Sandholm of Carnegie Mellon University. Libratus made headlines in January 2017 when it beat a group of champion human poker players in a 20-day no-limit tournament. Poker is a big challenge for AI because any poker player has to deal with incomplete information. The latter makes the computational challenge orders of magnitude harder, as one can not simply decompose a game in independent subgames, as is possible with chess or Go. Libratus used fundamentally new techniques for dealing with incomplete information, which have great potential for applications far beyond games. Industry days Libratus will play in a live demonstration against audience members on Tuesday August 13th. 
Distinguished Program Committee Members

The quality of IJCAI 2019 program strongly depends on the hard work of the program committee members. Distinguished members were nominated by the Area Chairs and Senior Program Committee members for their exceptional reviewing contribution. In IJCAI 2019 there were 2818 program committee members and 772 senior program committee members who reviewed 4752 papers. Out of them 36 were selected as Distinguished Senior Program Committee Members, 4 as Highly Distinguished Program Committee members and 113 as Distinguished Program Committee members.

Distinguished Senior Program Committee Members

Cedric Archambeau
Haris Aziz
Yngvi Bjornsson
Elizabeth Black
Kathryn Blackmond Laskey
Sylvain Bouvieret
Amedeo Cesta
Rama Chellappa
Berthe Choueiry
Martin Cooper
Cheng Deng
Jérôme Euzénat
Piotr Faliszewski
Pierre Flener
Davide Grossi
Paul Harrenstein
Patrik Haslum
Emmanuel Hebrard
Joerg Hoffman
Dietmar Jannach
Gabriele Kern-Isberner
Sébastien Konieczny
Jimmy Lee
Joao Leite
Carsten Lutz
Ines Lynce
Marie-Laure Mugnier
Sriraam Natarajan
Odile Papini
Simon Parsons
Leonard Poon
Laurent Simon
Ruck Thawonmas
Hanghang Tong
Roland Yap
Ding-Xuan Zhou

Distinguished Program Committee Members

Robert, Givan
Markus, Krötzsch
Brian, Logan

Yossi Adi
Baris Akgun
Mehdi Elahi
Ricardo Araujo
Linas Baltrunas
Dorothea Baumeister
Alejandro Belloggín
Olivier Boissier
Andrea Borghesi
Alexander Borgida
Mihaela Bornea
Maximiliano Celmo David Budan
Olivier Cailloux
Carlos Caleiro
Florent Capelli
Christophe Cerisara
Xiaojun Chen
Marcello D'Agostino
Dave de Jong
Bart de Keijzer
Dario Della Monica
Jérôme Delobelle
Emir Demirovic
Carmine Dodaro
Yue Dong
Sebastijan Dumancic
Alain Dutech
Cristina Feier
Oliver Fernandez Gil
Atsushi Fujita
Esther Galbrun
Serge Gaspers
Malvin Gattinger
Birte Glimm
François Goasdoué
Sebastian Gottifredi
Umberto Grandi
Dagmar Gromann
Riccardo Guidott
Daniel Harabor
Conor Hayes
Xiangnan He
Marijn Heule
Tsuyoshi Ide
Georgiana Ifrim
Laurent Jeanpierre
Tommi Junttila
Anna Jurek-Loughrey
Cezary Kaliszyk
IJCAI-19 Organisation

Current Trustees

Prof. Qiang Yang (Hong Kong University of Science and Technology, Hong Kong)
Prof. Michael Wooldridge (University of Oxford, UK)
Prof. Fahiem Bacchus (University of Toronto, Canada)
Prof. Carles Sierra (IIIA-CSIC, Catalonia, Spain)
Prof. Jeffrey Rosenschein (The Hebrew University of Jerusalem, Israel)
Prof. Jérôme Lang (University Paris Dauphine, France)
Prof. Thomas Eiter (Technische Universität Wien, Austria)
Prof. Sarit Kraus (Bar-Ilan University, Israel)
Prof. Christian Bessiere (Université Montpellier 2, France)
Prof. Maria Gini (University of Minnesota Twin Cities, USA)
Prof. Zhi-Hua Zhou (Nanjing University, France)

IJCAI secretariat

Prof. Bernhard Nebel (Albert-Ludwigs-Universitaet Freiburg, Germany)
Ms. Vesna Sabljakovic-Fritz (Vienna University of Technology, Austria)

Former trustees serving on the executive committee

Prof. Francesca Rossi (University of Padova, Italy)
Prof. Craig Knoblock (University of Southern California, USA)
Prof. Hiroaki Kitano (Sony Computer Science Laboratories, Inc., Japan)
Prof. Ramon López de Mántaras (IIIA-CSIC, Spain)
Prof. Fausto Giunchiglia (Universität Trento, Italy)
Prof. Anthony G. Cohn (University of Leeds, UK)
Prof. Hector Levesque (University of Toronto, Canada)
Prof. Luigia Carlucci Aiello (Università di Roma La Sapienza, Italya)
Dr. Michael P. Georgeff (Georgeff International Inc, Australia)
Dr. C. Raymond Perrault (SRI International, Artificial Intelligence Center, USA)
Prof. Wolfgang Wahlster (German Research Center for AI (DFKI), Germany)
Prof. Barbara J. Grosz (Harvard University, USA)
Prof. Wolfgang Bibel (Darmstadt University of Technology, Germany)
Prof. Alan Bundy (University of Edinburgh, UK)
Prof. Alan Mackworth (University of British Columbia, Canada)
Dr. Patrick J. Hayes (IHMC-UWF, USA)
Prof. D. Raj Reddy (Carnegie Mellon University, USA)
Prof. Erik Sandewall (Linkeping University, Sweden)

Other former Trustees

Prof. Subbarao Kambhampati (Arizona State University Tempe, USA)
Prof. Gerhard Brewka (Institute University of Leipzig Augustusplatz, DE)
Prof. Sebastian Thrun (Stanford University, USA)
Prof. Toby Walsh (NICTA, Australia)
Prof. Manuela M. Veloso (Carnegie Mellon University, USA)
Prof. Ramasamy Uthurusamy (General Motors Corporation, USA)
Prof. Leslie Pack Kaelbling (Massachusetts Institute of Technology, USA)
Prof. Georg Gottlob (University of Technology Vienna, Austria)
Prof. Bernhard Nebel (Albert-Ludwigs-Universitaet, Germany)
Prof. Thomas Dean (Brown University, USA)
Prof. Martha E. Pollack (University of Pittsburgh, USA)
Prof. Ronald J. Brachman (Jacobs Technion-Cornell Institute at Cornell Tech, USA)
Prof. Chris S. Mellish (University of Edinburgh, UK)
Prof. Ruzena Bajcsy (University of Pennsylvania, USA)
Prof. John Mylopoulos (University of Toronto, Canada)
Prof. John McDermott (Carnegie-Mellon University, USA)
Prof. Aravind Joshi (University of Pennsylvania, USA)
Prof. Alan Bundy (University of Edinburgh, UK)
Prof. Roger Schank (Yale University, USA)
Prof. Bruce Buchanan (Stanford University, USA)
Prof. Raj Reddy (Carnegie-Mellon University, USA)
Prof. Patrick Winston (Artificial Intelligence Laboratory, USA)
Prof. Saul Amarel (Rutgers University, USA)
Prof. Woodrow W. Bledsoe (University of Texas at Austin, USA)
Prof. Max B. Clowes (University of Sussex, UK)
Prof. David C. Cooper (Swansea University, UK)
Prof. Alistair D.C. Holden (University of Washington, USA)
Prof. Ray Reiter (University of Toronto, Canada)
Dr. N. S. Sridharan (FMC Corporation, Central Engineering Laboratories, USA)
Dr. Donald E. Walker (Bellcore, Morristown, USA)
Prof. Carl Hewitt (Artificial Intelligence Laboratory, USA)
Dr. Nils Nilsson (SRI International, USA)
Past IJCAI Conferences

This volume contains the proceedings of the twenty-eighth IJCAI conference. The locations and times of all 28 IJCAI conferences are as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>Macao, China</td>
<td>August 10–16</td>
</tr>
<tr>
<td>27</td>
<td>Stockholm, Sweden</td>
<td>July 13–19</td>
</tr>
<tr>
<td>26</td>
<td>Melbourne, Australia</td>
<td>August 19–25</td>
</tr>
<tr>
<td>25</td>
<td>New York, USA</td>
<td>July 9–15</td>
</tr>
<tr>
<td>24</td>
<td>Buenos Aires, Argentina</td>
<td>July 25–31</td>
</tr>
<tr>
<td>23</td>
<td>Beijing, China</td>
<td>August 3–9</td>
</tr>
<tr>
<td>22</td>
<td>Barcelona, Catalonia, Spain</td>
<td>July 16–22</td>
</tr>
<tr>
<td>21</td>
<td>Pasadena, California, USA</td>
<td>July 11–17</td>
</tr>
<tr>
<td>20</td>
<td>Hyderabad, India</td>
<td>January 6–12</td>
</tr>
<tr>
<td>19</td>
<td>Edinburgh, Scotland</td>
<td>July 30–August 5</td>
</tr>
<tr>
<td>18</td>
<td>Acapulco, Mexico</td>
<td>August 9–15</td>
</tr>
<tr>
<td>17</td>
<td>Seattle, Washington, USA</td>
<td>August 4–10</td>
</tr>
<tr>
<td>16</td>
<td>Stockholm, Sweden</td>
<td>July 31–August 6</td>
</tr>
<tr>
<td>15</td>
<td>Nagoya, Japan</td>
<td>August 23–29</td>
</tr>
<tr>
<td>14</td>
<td>Montreal, Canada</td>
<td>August 20–25</td>
</tr>
<tr>
<td>13</td>
<td>Chambery, France</td>
<td>August 28–September 3</td>
</tr>
<tr>
<td>12</td>
<td>Sydney, Australia</td>
<td>August 24–30</td>
</tr>
<tr>
<td>11</td>
<td>Detroit, Michigan</td>
<td>August 20–26</td>
</tr>
<tr>
<td>10</td>
<td>Milan, Italy</td>
<td>August 23–29</td>
</tr>
<tr>
<td>9</td>
<td>Los Angeles, California, USA</td>
<td>August 18–23</td>
</tr>
<tr>
<td>8</td>
<td>Karlsruhe, Germany</td>
<td>August 8–12</td>
</tr>
<tr>
<td>7</td>
<td>Vancouver, Canada</td>
<td>August 24–28</td>
</tr>
<tr>
<td>6</td>
<td>Tokyo, Japan</td>
<td>August 20–23</td>
</tr>
<tr>
<td>5</td>
<td>Cambridge, MA, USA</td>
<td>August 22–25</td>
</tr>
<tr>
<td>4</td>
<td>Tbilisi, Georgia, USSR</td>
<td>September 3–8</td>
</tr>
<tr>
<td>3</td>
<td>Stanford, California, USA</td>
<td>August 20–23</td>
</tr>
<tr>
<td>2</td>
<td>London, UK</td>
<td>September 1–3</td>
</tr>
<tr>
<td>1</td>
<td>Washington, D.C., USA</td>
<td>May 7–9</td>
</tr>
</tbody>
</table>