Column: AI's 10 to Watch

The Future of AI: AI's 10 To Watch

V.S. Subrahmanian

IEEE Intelligent Systems is promoting young and aspiring AI scientists via its biennial "AI's 10 to Watch" special section. The 2020 group consists of 10 young stars who have demonstrated outstanding AI achievements. In April 2020, *IEEE Intelligent Systems* called for nominations worldwide, with the requirement that nominees with doctorates must have received their PhDs since 2014. The selection committee, made up of *IEEE Intelligent Systems* editorial and advisory board members, finally had to select from a pool of 20+ highly competitive nominations. After a careful and detailed selection process, they voted on a short list of 10 top candidates. This final selection was based on scientific quality, reputation, impact, expert endorsement, and diversity. The vote for the final winners was unanimous.

This year's 10 to Watch are as follows (in alphabetical order).

- **Tathagata Chakraborti** works on human-AI collaboration and explainable AI. His main invention was to formulate the explanation process of AI systems as one of reconciliation of the mental model of the human with that of the agent model. He is considered to be one of the leading experts in human-aware planning and interpretability of agent behavior.
- **John Dickerson** is working where computer science, economics, and operations research meet. He has developed scalable batch clearing algorithms that were the basis for the kidney exchange plan in the U.S.: a perfect combination of theoretical AI with a life-saving real world application.
- **Fei Fang** has combined machine learning with game theory to address the important problems faced by our society. As an example, in the problem of antipoaching, poacher behavior models can be learned via ML techniques and game theory-based techniques can be used to design rangers' patrol strategies.
- **Song Han** is working on efficient neural networks at the intersection between machine learning and computer architecture. He was able to drastically reduce the computation, memory, and communication needed for DNN inference and training, which enables powerful AI to be incorporated in low-power mobile devices.
- **Kuldeep Meel** is working on "beyond NP" problems, which in most cases do not allow for exact methods. Kuldeep is a leading researcher in this area, his approach strikes the right balance between theory and practice leading to algorithms and software tools that combine rigorous approximation guarantees with scalable performance on industrial benchmarks.

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- **Nisarg Shah's** work, at the intersection of AI and economics, has the perfect blend of mathematical theory and practical applications. His seminal contributions to computational social choice have played a key role in Spliddit.org and RoboVote.org, which are freely available and used worldwide.
- **William Wang** has worked on the intersection of natural language processing with diverse areas such as probabilistic programming and deep learning. His work focused lately on information extraction and visually grounded natural language generation and reasoning.
- **Martha White** works on reinforcement learning, with a particular emphasis on extending temporal difference methods (e.g., off-policy learning; improved stepsize selection). She has also made contributions to (convex) optimization for semisupervised and unsupervised learning.
- **Diyi Yang,** with her Ph.D. from CMU only in 2019, has already published many papers at leading conferences and is heavily cited. She pioneered an approach in bringing together machine learning techniques with sociology and social psychology to model human communication in social context using natural language processing.
- **Hanwang Zhang** works in the interdiscipline of computer vision and natural language processing, with recent advances in causal inference to bring forward a new approach for robust, explainable, and unbiased multimodal analysis.

IEEE Intelligent Systems thanks selection committee members Michael Fisher (Manchester, U.K.), Kristina Lerman (USC, U.S.), Dana Nau (UMD, U.S.), and Balaraman Ravindran (Madras, IN), who devoted a lot of time studying the nomination materials and deliberating carefully about the best young members of our community. In the end, the magazine's editorial and advisory boards unanimously agreed on the top 10 candidates.

IEEE Intelligent Systems is proud to present these aspiring AI researchers in 2020's list of "AI's 10 to Watch."

—Jürgen Dix (Clausthal, DE), Selection Committee Chair and Editorial Board Member

Tathagata Chakraborti works on human-AI collaboration at IBM Research. His work makes foundational contributions for interpretable interactions with AI agents in terms of the reconciliation of the mental model of the user with the system model. With over 1000 citations, his work has already had a significant impact on the Explainable AI (XAI) community. He co-delivered a tutorial on the topic at AAAI 2020. His honors include a runner-up award for the best dissertation award and two people's choice system demo awards at ICAPS, as well as two IBM Ph.D. fellowships, and a national finalist recognition at the Microsoft Imagine Cup. Prior to joining IBM, he graduated from Arizona State University with the CIDSE Outstanding Graduate Award in 2019. He now leads CLAI, a popular open-source project from IBM, aimed at bringing the power of AI to the command line, for which he was recognized for outstanding contributions and leadership in IBM's cognitive and cloud platform. Contact him at Tathagata.Chakraborti1@ibm.com.

John Dickerson is an Assistant Professor of computer science at the University of Maryland as well as co-founder and Chief Scientist of Arthur AI, an enterprise-focused AI/ML model monitoring firm. He is a recipient of awards such as the NSF CAREER Award, Google Faculty Research Award, and paper awards and nominations at venues such as AAAI. His research centers on solving practical economic problems using techniques from computer science, stochastic optimization, and machine learning. He has worked extensively on theoretical and empirical approaches to organ exchange where his work has set policy at the UNOS nationwide kidney exchange; worldwide blood donation markets with Facebook; game-theoretic approaches to counter-terrorism and negotiation, where his models have been deployed; and market design problems in industry (e.g., online advertising) through various startups. He received the Ph.D. in computer science from Carnegie Mellon University. Contact him at john@cs.umd.edu.

Fei Fang is an Assistant Professor in the School of Computer Science at Carnegie Mellon University (CMU). Before joining CMU, she was a Postdoctoral Fellow at Harvard University. She received her Ph.D. from the University of Southern California (USC) in 2016. Her research lies in artificial intelligence (AI) and multi-agent systems, focusing on integrating machine learning with game theory. Her work has won several awards at top AI conferences, including the Distinguished Paper at IJCAI-ECAI'18, Innovative Application Award at IAAI'16, and the Outstanding Paper Award in CompSust Track at IJCAI'15. Her dissertation was selected as the runner-up for IFAAMAS-16 Victor Lesser Distinguished Dissertation Award, and the winner of the William F. Ballhaus, Jr. Prize, as well as the Best Dissertation Award in Computer Science at USC. Her work has led to successfully deployed applications for protecting ferry lines and anti-poaching, contributing to the theme of AI for Social Good. Contact her at feifang@cmu.edu.

Song Han is an Assistant Professor at MIT EECS. He received the Ph.D. degree from Stanford University. His research focuses on efficient deep learning computing. He proposed "deep compression" technique that can reduce neural network size by an order of magnitude without losing accuracy, and the hardware accelerator "EIE" that first exploited model compression and weight sparsity in deep learning accelerators, which impacted commercial AI chips from NVIDIA, Xilinx, Samsung, MediaTek, etc. His recent work on hardware-aware neural architecture search received many low-power computer vision challenge awards in flagship AI conferences. He received best paper awards at ICLR'16 and FPGA'17, the Amazon Machine Learning Research Award, SONY Faculty Award, Facebook Faculty Award, and NSF CAREER Award. He was named in the "35 Innovators Under 35" by *MIT Technology Review*. Contact him at songhan@mit.edu.

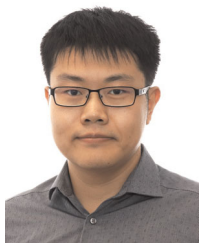
Kuldeep Meel is Sung Kah Kay Assistant Professor of Computer Science in the School of Computing at the National University of Singapore. His research interests lie at the intersection of artificial intelligence and formal methods. He is a recipient of the 2019 National Research Foundation (NRF) Fellowship for AI. His work received the 2018 Ralph Budd Award for Best Ph.D. Thesis in Engineering, the 2014 Outstanding Masters Thesis Award from Vienna Center of Logic and Algorithms, and the Best Student Paper Award at CP 2015. He received B. Tech. (with Honors) degree in computer science and engineering from the Indian Institute of Technology, Bombay, in 2012, and the M.S. and Ph.D. degrees from Rice University in 2014 and 2017, respectively. He has co-presented tutorials at UAI 2016, AAAI 2017, IJCAI 2018, and AAAI 2020. Contact him at meel@comp.nus.edu.sg.

Nisarg Shah is an Assistant Professor in the Department of Computer Science at the University of Toronto, and an affiliate faculty of the Vector Institute for Artificial Intelligence and the Schwartz Reisman Institute for Technology and Society. He received the Ph.D. from Carnegie Mellon University, and subsequently conducted postdoctoral research at Harvard University. His research lies at the intersection of artificial intelligence and economics, and develops theoretical foundations of fairness, efficiency, elicitation, and incentives in the context of algorithmic decision-making. He has co-developed two not-for-profit websites, Spliddit.org and RoboVote.org, which have helped more than 200,000 users make better everyday decisions. He is the winner of the 2016 IFAAMAS Victor Lesser Distinguished Dissertation Award, the 2014–2015 Facebook Ph.D. Fellowship, and the 2013–2014 Hima and Jive Graduate Fellowship. Contact him at nisarg@cs.toronto.edu.

William Wang is the Mellichamp Chair in Artificial Intelligence and Designs, and an Assistant Professor in the Department of Computer Science at the University of California, Santa Barbara. He is the Director of UC Santa Barbara's Natural Language Processing Group and Center for Responsible Machine Learning. He received the Ph.D. degree from Carnegie Mellon University. He has broad interests in machine learning approaches to data science, including statistical relational learning, information extraction, natural language generation, dialogue, language and vision, and computational social science. He has received best paper awards or nominations at ASRU 2013, CIKM 2013, EMNLP 2015, and CVPR 2019, a DARPA Young Faculty Award (Class of 2018), and more than 10 major research awards from Google, IBM, Facebook, Amazon, JP Morgan, and Adobe. His work and opinions appear at known tech media outlets such as Wired, VICE, Scientific American, Fortune, Fast Company, NASDAQ, The Next Web, Law.com, and Mental Floss. Contact him at william@cs.ucsb.edu.

Martha White is an Associate Professor of Computing Science at the University of Alberta. Before joining the University of Alberta in 2017, she was an Assistant Professor of Computer Science at Indiana University. Martha is a PI of AMII–the Alberta Machine Intelligence Institute–which is one of the top machine learning centres in the world, and a director of RLAI–the Reinforcement Learning and Artificial Intelligence Lab at the University of Alberta. She holds a Canada CIFAR AI Chair and has authored more than 40 papers in top journals and conferences. She has served as an area chair or meta-reviewer for the top conferences in AI and ML, including ICML, NeurIPS, AAAI and IJCAI, as well as co-program chair for ICLR, and is an Associate Editor for IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE. Her research focus is on developing algorithms for agents continually learning on streams of data, with an emphasis on representation learning and reinforcement learning. Contact her at whitem@ualberta.ca.

Diyi Yang is an Assistant Professor in the School of Interactive Computing, also affiliated with the Machine Learning Center, at Georgia Institute of Technology. She received the Ph.D. degree from the Language Technologies Institute, Carnegie Mellon University. Her research interests include computational social science and natural language processing. Her work has received multiple best paper award nominations from the 2015 Conference on Empirical Methods in Natural Language Processing, the 2016 International AAAI Conference on Web and Social Media, and the 2019 ACM CHI Conference on Human Factors in Computing Systems. Contact her at diyi.yang@gatech.edu.



Hanwang Zhang is an Assistant Professor at Nanyang Technological University's School of Computer Science and Engineering. He received the Ph.D. in computer science from National University of Singapore in 2014. His research interests include computer vision, natural language processing, causal inference, and their combinations. His work has received numerous awards including the IEEE TMM Prize Paper Award 2020, Alibaba Innovative Research Award 2019, ACM ToMM Best Paper Award 2018, ACM SIGMM Emerging Leader 2018, Nanyang Assistant Professorship 2018, ACM SIGIR Best Paper Honourable Mention Award 2016, and ACM MM Best Student Paper Award 2012. Along with his team, he works actively in causal inference for connecting vision and language. For example, their scene graph detection benchmark won the IEEE CVPR Best Paper Finalist 2019 and their visual dialog agent won the first place in Visual Dialog Challenge 2019 and second place in 2018/2020. Contact him at hanwangzhang@ntu.edu.sg.