

GeoAI 2018 Workshop Report

The 2nd ACM SIGSPATIAL International Workshop on GeoAI: AI for Geographic Knowledge Discovery Seattle, WA, USA - November 6, 2018

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In today's era of big data, advanced algorithms, and immense computational power, artificial intelligence (AI) is bringing tremendous opportunities and challenges to geospatial research. Big data enable computers to observe and learn the world from many different perspectives, while high performance machines support the developing, training, and applying of AI models within reasonable amount of time. Recent years have witnessed significant advances in the integration of geography and AI in both academia and industry. There have already been many successful studies. Focusing on modeling the physical nature, research has shown that deep learning can improve the representation of clouds that are smaller than the grid resolutions of climate models. Examining the human society, AI and natural language processing methods, such as word embeddings, are helping quantify changes in stereotypes and attitudes toward women and ethnic minorities over 100 years in the United States. There are also many other applications that effectively integrate AI with problems in geospatial studies, such as vehicle trajectory prediction, indoor navigation, historical map digitizing, gazetteer conflation, geographic feature extraction, geo-ontologies, and place understanding. The 2nd International Workshop on AI for Geographic Knowledge Discovery (GeoAI 2018) builds on the success of the previous workshop in 2017. GeoAI is bringing together geoscientists, computer scientists, engineers, entrepreneurs, and decision makers from academia, industry, and government to discuss the latest trends, successes, challenges, and opportunities in the field of artificial intelligence for data mining and geographic knowledge discovery.

GeoAI 2018 received 19 paper submissions in total. After a rigorous peer-review process by the program committee, 10 papers were accepted by the workshop and selected for presentations. Dr. Rangan Sukumar, Senior Analytics Architect from Cray Inc., gave a keynote on "The AI Journey in Geospatial Discovery: Navigating Shapes, Sizes and Spaces of Data" (industry keynote), and Dr. Bruno Martins, Assistant Professor at the University of Lisbon, gave a keynote on "GeoAI Applications in the Spatial Humanities" (academic keynote). This year's workshop also featured one wrap-up discussion on "How can we make GeoAI better?" Many participants contributed constructive ideas, such as encouraging future submissions on dataset descriptions, privacy and data bias issues, transparency and reproducibility, and explicit spatial constraints on AI models. Participants also discussed the possibility of adding a panel discussion, and core skills for students who want to build expertise in GeoAI. There are 51 participants who officially registered to GeoAI'18. The workshop attracted in average 50 participants, with a maximum of about 70 participants in the room.

We sincerely thank our program committee members for their time and efforts in reviewing and evaluating the submitted papers. We hope that the proceedings of GeoAI'18 can stimulate new ideas and make a modest contribution to this fast growing field.

2nd International Workshop on GeoAI

8:00 am	9:00 am	Breakfast
9:00 am	9:05 am	Welcome and announcements
9:10 am	10:00 am	Keynote: Rangan Sukumar, <i>Office of the CTO, Cray Inc.</i>
10:00 am	10:20 am	Aconcagua: A Novel Spatio-temporal Emotion Change Analysis Framework Karima Elgarroussi, <i>University of Houston</i> Sujing Wang, <i>Lamar University</i> Romita Banerjee, <i>University of Houston</i> Christoph F. Eick, <i>University of Houston</i>
10:20 am	10:40 am	SKATER-CON: Unsupervised Regionalization via Stochastic Tree Partitioning within a Consensus Framework Using Random Spanning Trees Orhun Aydin, <i>Environmental Systems Research Institute</i> Mark Janikas, <i>Environmental Systems Research Institute</i> Renato Assunção, <i>Universidade Federal de Minas Gerais</i> Ting-Hwan Lee, <i>Environmental Systems Research Institute</i>
10:40 am	11:00 am	A Deep Residual Network Integrating Spatial-temporal Properties to Predict Influenza Trends at an Intra-urban Scale Guikai Xi, <i>Chinese Academy of Sciences and University of Chinese Academy of Sciences</i> Ling Yin, <i>Chinese Academy of Sciences</i> Ye Li, <i>Chinese Academy of Sciences</i> Shujiang Mei, <i>Shenzhen Center for Disease Control and Prevention</i>
11:00 am	11:30 am	Coffee break
11:30 am	11:50 am	Vehicle Point of Interest Detection Using In-Car Data James Van Hinsbergh, <i>University of Warwick</i> Nathan Griffiths, <i>University of Warwick</i> Phillip Taylor, <i>University of Warwick</i> Alasdair Thomason, <i>University of Warwick</i> Zhou Xu, <i>Jaguar Land Rover</i> Alex Mouzakitis, <i>Jaguar Land Rover</i>
11:50 am	12:10 pm	Enhancing Trip Distribution Prediction with Twitter Data: Comparison of Gravity and Neural Networks Nastaran Pourebrahim, <i>University of North Carolina at Greensboro</i> Selima Sultana, <i>University of North Carolina at Greensboro</i> Jean-Claude Thill, <i>University of North Carolina at Charlotte</i> Somya Mohanty, <i>University of North Carolina at Charlotte</i>
12:10 pm	2:00 pm	Lunch (not provided)
2:00 pm	2:50 pm	Keynote: Bruno Martins, <i>University of Lisbon</i>
2:50 pm	3:10 pm	Vision-based UAVs Aerial Image Localization: A Survey Xu Yingxiao, <i>National University of Defense Technology</i> Long Pan, <i>Hunan University</i>

		<p>Chun Du, <i>National University of Defense Technology</i> Jun Li, <i>National University of Defense Technology</i> Ning Jing, <i>National University of Defense Technology</i> Jiangjiang Wu, <i>National University of Defense Technology</i></p>
3:10 pm	3:30 pm	<p>Combining Satellite Imagery and GPS Data for Road Extraction Tao Sun, <i>Tongji University</i> Zonglin Di, <i>Tongji University</i> Yin Wang, <i>Tongji University</i></p>
3:30 pm	3:50 pm	<p>Multi-label Building Functions Classification from Ground Pictures using Convolutional Neural Networks Shivangi Srivastava, <i>Wageningen University and Research</i> John Vargas-Muñoz, <i>University of Campinas</i> David Swinkels, <i>Wageningen University and Research</i> Devis Tuia, <i>Wageningen University and Research</i></p>
3:50 pm	4:00 pm	<p>When GeoAI Meets the Crowd T. Edwin Chow, <i>Texas State University</i></p>
4:00 pm	4:30 pm	Coffee break
4:30 pm	4:50 pm	<p>How Good is Good Enough? Quantifying the Effects of Training Set Quality Benjamin Swan, <i>Oak Ridge National Laboratory</i> Melanie Laverdiere, <i>Oak Ridge National Laboratory</i> H. Lexie Yang, <i>Oak Ridge National Laboratory</i></p>
4:50 pm		Wrap up discussion – Future Direction and Collaboration Opportunities

GeoAI 2018

Proceedings of the 2nd ACM SIGSPATIAL International Workshop on

AI for Geographic Knowledge Discovery

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Nov. 6th, 2018, Seattle, WA, USA

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FOREWORD

In today's era of big data, advanced algorithms, and immense computational power, artificial intelligence (AI) is bringing tremendous opportunities and challenges to geospatial research. Big data enable computers to observe and learn the world from many different perspectives, while high performance machines support the developing, training, and applying of AI models within reasonable amount of time. Recent years have witnessed significant advances in the integration of geography and AI in both academia and industry. There have already been many successful studies. Focusing on modeling the physical nature, research has shown that deep learning can improve the representation of clouds that are smaller than the grid resolutions of climate models. Examining the human society, AI and natural language processing methods, such as word embeddings, are helping quantify changes in stereotypes and attitudes toward women and ethnic minorities over 100 years in the United States. There are also many other applications that effectively integrate AI with problems in geospatial studies, such as vehicle trajectory prediction, indoor navigation, historical map digitizing, gazetteer conflation, geographic feature extraction, geo-ontologies, and place understanding.

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This year we received 19 paper submissions in total. After a rigorous peer-review process by the program committee, 10 papers were accepted by the workshop and selected for presentations. The workshop program also consists of two keynote talks from well-known experts from academia and industry.

Yingjie Hu, Song Gao, Shawn Newsam, and Dalton Lunga

ACKNOWLEDGEMENTS

We would like to thank the program committee members whose reviewing efforts are important for ensuring the quality of the accepted papers. In addition, many thanks to our keynote speakers who kindly accepted our invitations and will be sharing their research in GeoAI 2018.

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