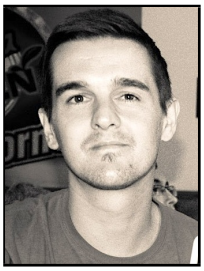
Michael Lees



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Personal information:
Nationality: British

The University of Nottingham, United Kingdom.
2006: PhD., School of Computer Science
Thesis title: *Adaptive Optimistic Simulation of Multi-Agent Systems*

The University of Edinburgh, United Kingdom.
2001: 1^{st} Class BSc (Hons), Computer Science and Artificial Intelligence

Employment

2014 (Nov) - present: Director Master Computational Science, University of Amsterdam.
2013 (Aug) - present: Assistant Professor, University of Amsterdam.
2009 (Nov) - 2013 (Aug): Assistant Professor, NTU, Singapore.
2008 (Nov) - 2009 (Nov): Senior Research Fellow, NTU, Singapore.
2005 (Dec) - 2008 (Nov): Research Fellow, Nottingham University, UK.
2004 (Nov) - 2005 (Dec): Research Associate, Birmingham University, UK.

Research Interests

My current research interests involves the use and development of computational techniques to help understand human or social complex systems. Human systems (and society at large) can be considered as a complex adaptive system and the non-trivial phenomena observed in social systems exhibit self-organised and emergent properties. If we want to understand: why neighbourhoods segregate, the way cities grow, understand why groups of individuals may or may not stampede, or how a seemingly innocuous policy may drive a system to cascading failures, then we need to understand the connectivity and behaviour of the individuals in these systems. Traditional forms of mathematical analysis are often ill-equipped to tackle these problems. Complex Systems models (e.g., agent-based models) are the primary method for reasoning about human complex systems.

My research agenda focuses on the development of (computational models of) artificial societies in order to understand (and perhaps manipulate) complex social processes. The scientific method I apply involves the development of data-driven models that provide virtual replicas of social processes. Therefore my research spans everything from data collection (and analysis), to the development of new computational methods for semi-automated model creation, to the application of models in real world policy. My work has been successfully applied to a number of societal challenges in funded research projects (see: School Segregation, Slum Growth, Crowd Dynamics, Transportation).

Advisees

Current: 6 PhD (1 open position)
Graduated: 5 PhD

1. Xing Pengfei : Project Officer (Jul 2010 - Jul 2011)
2. Heiko Aydt : Research Fellow (April 2011 - August 2012)
3. Vaisagh Viswanathan T : PhD student (Sep 2010 - August 2014)
4. Hu Nan : PhD student (October 2010 - April 2014)
5. Zhang Tianyou PhD student (Co-supervisor, part time October 2010 - Present)
6. Xu Yadong : PhD student (Aug 2011 - 2016)
7. Debraj Roy : PhD student (Aug 2012 - 2017)

8. Jurjen Helmus : PhD Student (Aug 2016 - 2021)
9. Philip Rutten : PhD Student (Feb 2016 - 2021)
10. Vlad Karbovskii: External PhD (May 2017 - 2021)
11. Valentin Melinkov: External PhD student (Sept 2017 - 2021)
12. Debraj Roy : Research Fellow (Sept 2017 - Sept 2019)
13. Eric Dignum: PhD Student (Sep 2019 - 2023)
14. Maarten van den Ende: PhD Student (Feb 2020 - 2024)
15. Open PhD Position (May 2020)
16. Open Post-doc Position (Sept 2020)

GRADUATE ADVISORS

Brian Logan, University of Nottingham
Georgios Theodoropoulos, Sustech University

HONORS

Best paper award at Euro-SIW 2003
Best paper Nominee Parallel and Distributed Simulation (PADS) conference 2006
Best paper AsiaSim 2013

GRANTS

AMSTERDAM - TOTAL: 2.31M €

SIM-CITY: Decision Support For Urban Social Economic Complexity (Co-PI, 487K€ Netherlands eScience Grant Nov 13 - Nov 17).

The Kumbh Mela Experiment: Measuring and Understanding the dynamics of mankinds largest crowd (Co-PI, 425K€ NWO Indo-Dutch Grant October 2015 - March 2020).

Intelligente Data-gedreven Optimalisatie laadinfrastructuur (Co-PI, 50K€ + 1 PhD Student, Raak-Pro July 2015 - Aug 2020).

ArenA: Detecting anomalous behavior in stadium crowds with location analytics based on data collected with Wi-Fi and Bluetooth sensors in the Amsterdam Arena. (CO-PI, 100k€, NWO-eScience: Alliance project Mar 2016 - Feb 2017).

DynaSlum: Data Driven Modeling and Decision Support for Slums (PI, 487K€, NWO-eScience: Accelerating Scientific Discovery (ASDI) June 2016 - Dec 2019).

Agent Based Modelling Of School Choice And Primary School Segregation (PI , 375K€ School Inspectorate Netherlands and City of Amsterdam Mar 2019 - Feb 2023).

Computational modelling of psychological and social dynamics and urban mental health conditions: the case of addictive substance use (PI (Joint), 387K€ Urban Mental Health Research Priority Area Feb 2020 - Feb 2024).

Reasoning about the Ramifications of Data Integration for Multi-scale Modeling (PI (Joint), 1 Phd Student, Institute for Informatics May 2020- - May 2024).

SINGAPORE - TOTAL: 2.95M S$

Validation of Agent-based simulation through Human Computation (PI, 100K S$ NTU Startup grant for March 2010 - February 2013).

DEPATHSS : Dynamic Egress PlAnning ThrougH valid Symbiotic Simulation (PI, 50K S$ funded by NTU/MoE's AcRF Tier-1 Grant for March 2011 - February 2013).

TUM-Create: Centre for Electromobility (NTU-PI, 740kS$ of 25MS$ funded by National Research Foundation Create Programme for March 2011 - February 2016).

CROSIT: Crowd Situations Training System (Co-PI, 270k of 540k S$ funded by ST Electronics through MINDEF May 2012 - March 2014).

Youth Delinquency and Violence in Singapore: A Data-Driven Simulation Study. (Co-PI, 346k S$ funded by MOE Tier 2 for November 2012 - November 2014).

MAGIC: Multi-platform Game Inovation Centre. (PI, 250k S$ funded by Media Development Authority for November 2012 - November 2017).

Virtual Singapore (Co-PI, 1.2M S$ funded by NRL for November 2018 - November 2020).

Committees & Editorships

Board Member Netherlands Platform for Complex Systems (npcs.nl) 2017-present.

Publications Chair/Session Chair IEEE/ACM Distributed Simulation and Real Time Applications 2009.

Publications Chair/Local Organizer/Session Chair IEEE/ACM MASCOTS Conference 2011.

Program Committee Member MABS11 12th International Workshop on Multi-Agent-Based Simulation, in conjunction with AAMAS. IEEE International Conference on Advanced Information Networking and Applications 2011. IEEE/ACM International Symposium on Distributed Simulation and Real Time Applications 2010-2015. AAMAS 2015, Intelligent Agent Technologies IAT-2015, SIMUTools 2016-2019, Winter Simulation Conference 2016-2018. Conference on Complex System 2016-2019, ACM SIGSIM Conference on Principles of Advanced Discrete Simulation (PADS) 2017-present.

Publications Chair/Local Organizer International Conference on Computational Science 2011.

Publications Chair/Programme Committee SIMUTOOLS 2013-present, AsiaSim 2013, Distributed Simulation and Real Time Applications 2015. Conference on Complex System 2016-2020.

Workshops Chair - International Conference on Computational Science 2011-present, SIMUTools 2015

Editor - Journal of Computational Science 2011-present, ACM Transactions on Modeling and Computer Simulation 2015-2018.

Reviewer

Distributed Simulation and Real Time Applications, Principles of Advanced and Distributed Simulation, IEEE MASCOTS Conference, IEEE Computational Intelligence Manngazine, Journal of Computational Science. PLoS Computational Biology, International Conference on Computational Science, Winter Simulation Conference, SIMUTools International ICST Conference on Simulation Tools and Techniques, SCS Simulation, SIMPAT, Future Generation Computing Systems, Computer Environment and Urban Systems, Environmental Modelling and Software.

Teaching

I take an active role in teaching and pride myself on developing materials that are effective, enjoyable and promote self learning. I have taught full time since 2009 and covered a large number of courses and topics. The subjects I have lectured include Concurrency, Intelligent Agents, Introduction to Computational Thinking, Modelling Your World, Introduction to Computational Science, Complex System Simulation and Agent-based Modelling. The courses have been offered at Nanyang Technological University (NTU), Amsterdam University College (AUC) and The University of Amsterdam (UvA). These courses span all levels of bachelor students and Master's students. Class sizes have varied from ten students (AUC), up to six hundred students (NTU). I have taught students of various nationalities, from all across Europe and Asia. My teaching feedback is typically well above average

and I feel I generally have a good rapport with students. With regard to teaching administration and planning, I have developed a total of five complete new courses, including all lecture, practical and general study material. Beyond individual courses I have been involved with overall curriculum development. I was a committee member (for 2 years) of the Blue Ribbon Commission 2010: Redesigning the Computer Engineering Curriculum with NTU. I received my BKO certificate at UvA in March 2015. At UvA I have taken the role of Director for the Master Computational Science since Nov 2014. In 5 years the programme has grown from 30 students to 150 students and is ranked as one of the best programmes in the faculty of science (https://www.studiekeuze123.nl/nse)

Journals

[1] D. Roy and M. Lees. Understanding resilience in slums using an agent-based model. In: *Computers, Environment and Urban Systems* 80 (2020), p. 101458.

[2] S. Georgievska, P. Rutten, J. Amoraal, E. Ranguelova, R. Bakhshi, B. L. DE Vries, M. Lees, and S. Klous. Detecting high indoor crowd density with Wi-Fi localization: A statistical mechanics approach. In: *Journal of Big Data* 6.1 (2019), p. 31.

[3] J. R. Helmus, S. Wachlin, I. Vermeulen, and M. H. Lees. SEVA: A Data driven model of Electric Vehicle Charging Behavior. In: *arXiv preprint arXiv:1904.08748* (2019).

[4] V. Karbovskii, O. Severiukhina, I. Derevitskii, D. Voloshin, A. Presbitero, and M. Lees. The impact of different obstacles on crowd dynamics. In: *Journal of Computational Science* 36 (2019), p. 100893.

[5] E. Ranguelova, B. Weel, D. Roy, M. Kuffer, K. Pfeffer, and M. Lees. Image based classification of slums, built-up and non-built-up areas in Kalyan and Bangalore, India. In: *European journal of remote sensing* 52.sup1 (2019), pp. 40–61.

[6] D. Roy, D. Bernal, and M. Lees. An exploratory factor analysis model for slum severity index in Mexico City. In: *Urban studies* (2019), p. 0042098019869769.

[7] I. Vermeulen, J. R. Helmus, M. Lees, and R. Van Den Hoed. Simulation of Future Electric Vehicle Charging behavior—Effects of transition from PHEV to FEV. In: *World Electric Vehicle Journal* 10.2 (2019), p. 42.

[8] T. M. Abuhay, S. V. Kovalchuk, K. Bochenina, G.-K. Mbogo, A. A. Visheratin, G. Kampis, V. V. Krzhizhanovskaya, and M. H. Lees. Analysis of publication activity of computational science society in 2001–2017 using topic modelling and graph theory. In: *Journal of computational science* 26 (2018), pp. 193–204.

[9] J. Helmus, J. Spoelstra, N. Refa, M. Lees, and R. VAN DEN Hoed. Assessment of public charging infrastructure push and pull rollout strategies: The case of the Netherlands. In: *Energy policy* 121 (2018), pp. 35–47.

[10] V. Melnikov, V. V. Krzhizhanovskaya, M. H. Lees, and P. M. Sloot. System dynamics of human body thermal regulation in outdoor environments. In: *Building and Environment* 143 (2018), pp. 760–769.

[11] D. Roy, M. H. Lees, K. Pfeffer, and P. M. Sloot. Spatial segregation, inequality, and opportunity bias in the slums of Bengaluru. In: *Cities* 74 (2018), pp. 269–276.

[12] D. Roy, B. Palavalli, N. Menon, R. King, K. Pfeffer, M. Lees, and P. M. Sloot. Survey-based socio-economic data from slums in Bangalore, India. In: *Scientific data* 5 (2018), p. 170200.

[13] T. M. Abuhay, S. V. Kovalchuk, K. O. Bochenina, G. Kampis, V. V. Krzhizhanovskaya, and M. H. Lees. Analysis of Computational Science Papers from ICCS 2001-2016 using Topic Modeling and Graph Theory. In: *Procedia Computer Science* 108 (2017), pp. 7–17.

[14] P. Koumoutsakos, E. Chatzi, V. V. Krzhizhanovskaya, M. Lees, J. Dongarra, and P. M. Sloot. The Art of Computational Science, Bridging Gaps–Forming Alloys. Preface for ICCS 2017. In: *Procedia Computer Science* 108 (2017), pp. 1–6.

[15] L. Luo, H. Yin, W. Cai, J. Zhong, and M. Lees. Design and evaluation of a data-driven scenario generation framework for game-based training. In: *IEEE Transactions on Computational Intelligence and AI in Games* (2017).

[16] D. Roy, M. H. Lees, K. Pfeffer, and P. M. Sloot. Modelling the impact of household life cycle on slums in Bangalore. In: *Computers, Environment and Urban Systems* 64 (2017), pp. 275–287.

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[17] D. Roy, M. H. Lees, K. Pfeffer, and P. M. Sloot. Spatial segregation, inequality, and opportunity bias in the slums of Bengaluru. In: *Cities* (2017).

[18] O. Severiukhina, D. Voloshin, M. Lees, and V. Karbovskii. The study of the influence of obstacles on crowd dynamics. In: *Procedia Computer Science* 108 (2017), pp. 215–224.

[19] Y. Xu, W. Cai, H. Aydt, M. Lees, and D. Zehe. Relaxing Synchronization in Parallel Agent-Based Road Traffic Simulation. In: *ACM Transactions on Modeling and Computer Simulation (TOMACS)* 27.2 (2017), p. 14.

[20] J. Zhong, W. Cai, M. Lees, and L. Luo. Automatic model construction for the behavior of human crowds. In: *Applied Soft Computing* 56 (2017), pp. 368–378.

[21] I. Altintas, M. Norman, J. Dongarra, V. Krzhizhanovskaya, M. Lees, and P. Sloot. International Conference on Computational Science 2016, ICCS 2016: 6-8 June 2016, San Diego, California, USA. In: *Procedia Computer Science* 80 (2016).

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[26] L. Luo, W. Cai, S. Zhou, M. Lees, and H. Yin. A review of interactive narrative systems and technologies: a training perspective. In: *Simulation* 91.2 (2015), pp. 126–147.

[27] S. Mei, B. Chen, Y. Zhu, M. H. Lees, A. Boukhanovsky, and P. M. Sloot. Simulating city-level airborne infectious diseases. In: *Computers, Environment and Urban Systems* 51 (2015), pp. 97–105.

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[29] V. Viswanathan, M. Lees, and P. M. A. Sloot. The influence of memory on indoor environment exploration: A numerical study. In: *Behavior research methods* (2015), pp. 1–19.

[30] M. Wagner, W. Cai, M. H. Lees, and H. Aydt. Evolving agent-based models using self-adaptive complexification. In: *Journal of Computational Science* 10 (2015), pp. 351–359.

[31] J. Zhong, N. Hu, W. Cai, M. Lees, and L. Luo. Density-based evolutionary framework for crowd model calibration. In: *Journal of Computational Science* 6 (Jan. 2015), pp. 11–22.

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[39] L. Luo, H. Yin, W. Cai, M. Lees, and S. Zhou. Interactive scenario generation for mission-based virtual training. In: *Computer Animation and Virtual Worlds* 24.3-4 (May 2013), pp. 345–354.

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[48] M. Xiong, M. Lees, W. Cai, S. Zhou, and M. Y. H. Low. Hybrid modelling of crowd simulation. In: *Procedia Computer Science* 1.1 (May 2010), pp. 57–65.

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Conferences

[58] B. Andela, B. Weel, E. Ranguelova, N. Drost, M. Filtenborg, D. Barten, D. Roy, and M. Lees. Satsense: an open source Python library for land-use and land-cover classification using earth observation data. In: *Geophysical Research Abstracts*. Vol. 21. 2019.

[59] J. Helmus, R. VAN DEN Hoed, and M. Lees. Exploring a Complex Systems Approach to Charging Infrastructure: implications for researchers and policy makers. In: *32nd International Electric Vehicle Symposium*. Vol. 23. 2019, p. 23.

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[61] B. Weel, C. Martinez, J. Borgdorff, M. VAN Meersbergen, and M. Lees. ReGIS-Visualization and Simulation of GIS data made easy. In: *EGU General Assembly Conference Abstracts*. Vol. 20. 2018, p. 15188.

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[63] Y. Xu, W. Cai, H. Aydt, M. Lees, and D. Zehe. An asynchronous synchronization strategy for parallel large-scale agent-based traffic simulations. In: *Proceedings of the 3rd ACM SIGSIM Conference on Principles of Advanced Discrete Simulation*. ACM. 2015, pp. 259–269.

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