

# Dr. STANISLAV SOBOLEVSKY

Research Scientist and Co-Lead of Network and Society Area, SENSEable City Lab, MIT  
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## Summary

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Mathematician by training leveraging big data created by human activity for research and innovation. I'm passionate in applying mathematical methods, analytic mindset and problem solving skills to exciting scientific problems and real-world challenges facing modern society, developing new algorithms and approaches as well as building innovative data-driven business models and solutions. I'm committed to opening up the potential of mathematics and data analysis for research and industrial innovations to the students, academic community, governmental and business stakeholders as well as the general public

## Interests

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Mathematical modeling, Big data, Network science and complexity, Machine Learning, Quantitative and Statistics, Finance, Differential Equations, Smart Cities

## Degrees

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| 2009 | Doctor of Science (highest scientific habilitation degree in Belarus and C.I.S. countries), Mathematics, National Academy of Science, Belarus |
| 1999 | PhD, Mathematics, Grodno State University, Belarus  |
| 1998 | Diploma with honors, Mathematics, Grodno State University, Belarus, GPA 5.0/5   |

## Experience

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| 2012-present | <p><b><i>Co-lead of Network and Society area, SENSEable city lab, MIT</i></b><br/>(Cambridge, MA, <a href="http://senseable.mit.edu">http://senseable.mit.edu</a>)</p> <p>Leading lab's research initiative to understand people and cities through the big data of their digital footprints (structured and unstructured spatio-temporal datasets including cell phone data, credit card transactions, GPS traces, social media etc) and projects with industrial partners (banks, insurance and telecom companies including BBVA, Liberty Mutual, Ericsson, British Telecom, Orange, Saudi Telecom; areas vary from the study of human mobility and social networks to credit risk scoring), research in network science, big data, data mining and analytics.</p> <ul style="list-style-type: none"><li>• Supervised the multidisciplinary team of the lab's postdocs, PhD students as well as visiting students and researchers;</li><li>• Recruited new postdocs and students for the lab, served as a member of the admissions committee;</li><li>• Authored and co-authored over 25 research publications in the leading multidisciplinary journals and conferences: optimization algorithms for community detection in complex networks, human mobility modeling, applications to the delineation of country's regional structure, urban classifications, transportation optimization, etc;</li><li>• Successfully managed research projects of a total budget of over \$1M, leading to the extension of existing sponsorship agreements;</li><li>• Prototyped new data-driven business solutions (such as an electronic urban dashboard of touristic activity based on bank card transactions and advanced city and local neighborhoods microeconomic scoring system predicting location's potential for business and economic development through supervised and unsupervised machine learning approaches);</li><li>• Improved existing business decision-making systems of the lab's partners (such as a bank's credit risk scoring system for small businesses based on customers' transaction data using a supervised machine learning approach);</li></ul> |
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- Promoted the lab by giving invited talks, tutorials and presentations to a number of prospective industrial sponsors, leading to the establishment of new sponsorship relations;
  - Led and participated in the grant proposal writing.
- 2009-2012 **Deputy director, Director** (since 2010) of the **Institute of Lifelong Education, Belarusian State University** (Minsk, Belarus, <http://lifedu.by>, from 2015 merged with the School of Business and Management of Technology)  
General management of the institute (post-graduate education, professional development; 200 full- and part-time faculty and other employees, around 2500 short and long-term students per year), coordination of research activities. Created three new departments teaching eight new licensed professional development courses, which led to more than doubling of the institute's student audience over three years; restored economical efficiency of the institute; launched a training program for gifted secondary school students; for the first-time established sponsored research activities at the institute winning four government-funded research grants, which allowed to create a research lab; facilitated the transition of the Regional Center of the International Baltic University Program into Belarusian State University.
- 2005-2012 **Associate Professor, Full Professor** (since 2009, part-time), **Department of Applied Mathematics and Information Technology, Belarusian State University** (Minsk, Belarus, <http://www.bsu.by>)  
Taught specialized courses of Mathematical Modeling, Network Science, Optimization Algorithms on Graphs, Data Analysis; supervised term, masters and PhD students.
- 1999-2000, 2007-2011 **Research scientist, Senior research scientist** (since 2007, part-time), **Lead Research scientist** (since 2009, part-time), **Institute of Mathematics, National Academy of Science of Belarus** (Minsk, Belarus, <http://im.bas-net.by>)  
Research in the theory of differential equations, mathematical modeling. Coordinated government-funded fundamental research projects.
- 2006-2009 **Project manager, Altsoft s.r.o.** (Belgium-Czech Republic-Belarus, Minsk office, <http://alt-soft.com>)  
Strategy, sales, management of implementation and support teams for the Xml2PDF project. Successfully launched international sales for the Altsoft Xml2PDF .NET API product for server-side conversion of XML documents to PDF and other print-ready formats, managed implementation and release of the new product version.
- 2002-2003 **Software developer, JVL corporation** (Canada-Belarus, Minsk office, <http://www.jvl-ent.com>)  
Development of computer games. Implemented several games in C++ for a special gaming machine platform under Unix environment.
- 2000-2001, 2009-2011 **Senior engineer, Senior research scientist, Professor** (since 2009, part-time), **Institute for Command Engineering, Ministry on Emergencies, Belarus** (Minsk, Belarus, <http://kii.gov.by>);  
Research and organization of graduate studies. Developed an implementation of the improved methodology for time estimation of people forced evacuation further included into the official guidelines for emergency prevention; organized the PhD studies in the Institute; toughed Basics of Statistics.

#### Other activities

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- 2011 **Consultant at the General Satellite Corporation** (Saint Petersburg, Russia) in organization of the Educational and Research Center within the project "Technopolis Gusev"; <http://technopolis.gs>
- 2003-2009 **Individual entrepreneur** (Minsk, Belarus), start-up of a private translation studio; coordinating over 100 freelancer translators, web and local services; <http://transterra.ru>;
- 1995-2012 **Organizer** and member of the judge panels for the regional and Republican

**Mathematical Olympiads** in Belarus; organizer of the **summer schools** for gifted secondary school students

### Awards and fellowships

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2015	Winner of the LinkedIn Economic Graph Challenge (winning research proposal of the team under my lead awarded a research grant, equipment and data access)
2010	President's foundation fellowship for Doctor of Science researchers (Belarus)
2002	President's foundation fellowship for Ph.D. researchers (Belarus)
2000	Best research work among young scientists award of Department of Physics and Mathematical sciences of National Academy of Science of Belarus
1995-1996, 1997-1998	President's foundation (Belarus) stipend for talented students
1994-1996	Soros foundation stipend for talented students
1995	Second diploma on student programming team contest (Belarus)
1993,1994	Silver medals on two International Mathematical Olympiads
1991-1994	Absolute winner of 4 Republican Mathematical Olympiads (Belarus), winner of regional Programming contests, Physics and English Olympiads

### Languages

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Russian (native), English, Belarusian, Polish (fluent), German (basic)

### IT Skills

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MATLAB, Mathematica, Python, R, C/C++, SQL, Delphi, Java, PIG/Hadoop

### Personality

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Highly motivated and result-oriented, creative, exceptional problem solving and strong presentation and leadership skills, entrepreneurial, collaborative, optimistic, empathetic; able to achieve goals both individually and within the team environment; possess a combination of academic and practice-oriented vision; excited about learning and teaching new approaches and technologies

### Selected Publications

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1. **Sobolevsky, S.** "Painlevé classification of binomial type ordinary differential equations of the arbitrary order." *Studies in Applied Mathematics* 117, no. 3 (2006): 215-237. <http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9590.2006.00353.x/abstract>
2. Ratti C., **Sobolevsky S.**, Calabrese F., Andris C., Reades J., Martino M., Claxton R., Strogatz S. H. (2010) Redrawing the map of Great Britain from a network of human interactions. *PLoS ONE*, Vol.12(5), e14248 <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0014248#pone-0014248-g003>
3. **Sobolevsky S.**, Szell M., Campari R., Couronne T., Smoreda Z., Ratti C. (2013) Delineating geographical regions with networks of human interactions in an extensive set of countries. *PLoS ONE* 8 (12), e81707 <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0081707>
4. **Sobolevsky, S.**, Campari, R., Belyi, A., & Ratti, C. (2014). A general optimization technique for high quality community detection in complex networks. *Phys. Rev. E* 90 (1), 012811 <http://link.aps.org/doi/10.1103/PhysRevE.90.012811>
5. Santi, P., Resta, G., Szell, M., **Sobolevsky, S.**, Strogatz, S. H., & Ratti, C. (2014). Quantifying the benefits of vehicle pooling with shareability networks. *Proceedings of the National Academy of Sciences*, 111(37), 13290-13294. <http://www.pnas.org/content/early/2014/08/27/1403657111.short>
6. Kung KS, Greco K, **Sobolevsky S**, Ratti C (2014) Exploring Universal Patterns in Human Home-Work Commuting from Mobile Phone Data. *PLoS ONE* 9(6): e96180. doi:10.1371/journal.pone.0096180. <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0096180>
7. Amini, A., Kung, K., Kang, C., **Sobolevsky, S.**, Ratti, C. (2014). The impact of social segregation on human mobility in developing and industrialized regions. *EPJ Data Science*, 3(1), 6. <http://www.epjdatascience.com/content/3/1/6/abstract>
8. **Sobolevsky, S.** "Painleve Classification of Polynomial Ordinary Differential Equations of Arbitrary

- Order and Second Degree." arXiv preprint arXiv:1410.2649 (2014). <http://arxiv.org/abs/1410.2649>
9. Paldino, S., Bojic, I., **Sobolevsky, S.**, Ratti, C., & González, M. C. Urban Magnetism Through The Lens of Geo-tagged Photography. arXiv preprint arXiv:1503.05502 (2015). <http://arxiv.org/abs/1503.05502> Accepted for EPJ Data Science
  10. **Sobolevsky, S.**, Sitko, I., Combes, R. T. D., Hawelka, B., Arias, J. M., & Ratti, C. (2015). Cities through the Prism of People's Spending Behavior. arXiv preprint arXiv:1505.03854 <http://arxiv.org/abs/1505.03854>
  11. Tachet, R., Santi, P. **Sobolevsky, S.**, Reyes-Castro, L.-I., Frazzoli, E., Helbing, D., Ratti, C. (2015) Revisiting traffic intersection control using slot-based systems. *Submitted*
  12. Grauwin, S., Szell, M., **Sobolevsky, S.**, Hoevel, P., Simini, F., Vanhoof, M., Smoreda, Z., Barabasi, A.-L. & Ratti, C. (2015) Identifying the structural discontinuities of human interactions. *Submitted*

In total: 1 monograph, 2 book chapters, 2 textbooks, over 50 peer reviewed journal papers (PNAS, Physical Review E, PLoS ONE, EPJ Data Science, International Journal of GIS, Environmental Planning B, Studies in Applied Mathematics, Differential Equations and others), over 30 conference proceeding papers (IEEE BigDATA 2014 (Anchorage, AK), ASE BigDataScience 2014 (Stanford, CA), IEEE MDM 2013 (Milan, Italy), ACM UrbComp, 2013 (Chicago, IL), NetMob 2013 (Cambridge, MA), GeoComputation 2013 (Wuhan, China) and others; details on: <http://scholar.google.com/citations?user=EDxKh4kAAAAJ&hl=ru&oi=ao>

#### **Recent invited talks and tutorials**

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- Invited talk at MIT Big Data Initiative at CSAIL Member Workshop "DATA TO INSIGHTS" <http://bigdata.csail.mit.edu/datatoinsights>
- IEEE International Congress on BigData 2014 (Anchorage, AK) – 3 hour tutorial (<http://www.thecloudcomputing.org/2014/AdvanceProgram-ICWS-SCC-CLOUD-MS-BigDataCongress-SERVICES-2014.pdf>, <http://www.servicescongress.org/2014/Tutorials.html#t2> )
- Invited talk on Urban Systems Institute Workshop in Pittsburgh, PA, 2014 (<http://www.ices.cmu.edu/usi/agenda.htm>),
- Invited talk on MPE 2013+ Workshop on Sustainable Human Environments, Rutgers University, NJ, 2014, (<http://dimacs.rutgers.edu/Workshops/HumanEnvironments/program.html>)
- Invited talks on Urban Networks, Sustainability And Resilience (<https://sustainability.asu.edu/events/rsvp/urban-networks-mini-symposium>) and Urbanization, Sustainability, Resilience, and Prosperity workshops in Arizona State University, Tempe, AZ in 2012 and 2013.

#### **Editorial boards, program committees and reviewer activities**

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- Organizer of the upcoming symposium "CompleXity: Technology for Complex Urban Systems" at the 49th Hawaii International Conference on System Sciences [complexity.urban-systems.net](http://complexity.urban-systems.net)
- Guest editor of the special issues "Big Data Analytics, Infrastructure and Applications" of IEEE Transactions on Services Computing, "Big Data Analytics and Business Intelligence in Industry" in Elsevier's Information Systems Frontiers and "Technology for Complex Urban Systems" of Springer's Transactions on Large-Scale Data- and Knowledge-Centered Systems
- Applications Track Chair at IEEE BigData Congress (New York, 2015) and Program Committee member of IEEE International Conference on Cloud Computing Technology and Science (Singapore, 2014), 2015 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (Paris, 2015), IEEE International Conference on Computational Science and Engineering (CSE2015, Porto, Portugal), 7th IEEE International Conference on Cloud Computing Technology and Science (CloudCom'2015, Vancouver, Canada), 4th International Workshop on Pervasive Urban Applications (PURBA-2015, Osaka, Japan) and a number of Belarusian mathematical and information technology conferences
- Reviewer in Physical Letters A, PLoS ONE, International Journal of GIS, Springer's Information Systems Frontiers, Elsevier's Computers, Environment and Urban Systems, Elsevier's Telecommunications Policy, IEEE Transactions on Services Computing, Royal Society Open Science as well as a number of Belarusian mathematical journals.