

Michael Fire

Data Scientist

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Professional Profile

- **Extensive experience** as a data scientist in academia and industry
- Over **35 published papers and patents**, including in IEEE COMST, Springer NETS, Elsevier Neurocomputing, and ACM TIST
- **Prestigious awards** for excellence in research, including the Moore/Sloan Data Science and WRF Innovation in Data Science Postdoctoral Fellowships, Kreitman Award for best PhD candidate, and an invitation to the 2014 Heidelberg Laureate Forum

Research Interests

- Data Science
- Complex Networks
- Cyber Security
- Machine Learning
- Social Networks Analysis
- Large-Scale Data Mining

Education

- 2015–Present **Postdoctoral Fellow**, *Computer Science*, University of Washington, Seattle, WA.
Advisors Carlos Guestrin and Joshua Blumenstock
- 2013–2015 **Postdoctoral Researcher**, *Information System Engineering*, Ben-Gurion University, Beer-Sheva, Israel.
Advisor Yuval Elovici
- 2011–2013 **Ph.D.**, *Information System Engineering*, Ben-Gurion University, Beer-Sheva, Israel (*Summa Cum Laude*).
Title Social Network Data Analytics using Machine Learning and Graph Theory Algorithms
Advisor Yuval Elovici
- 2003–2004 **M.Sc.**, *Mathematics*, Bar-Ilan University, Ramat-Gan, Israel (*Magna Cum Laude*).
Title Statistics on Wreath Products
Advisors Ron Adin and Yuval Roichman
- 2000–2004 **B.Sc.**, *Computer Science & Mathematics*, Bar-Ilan University, Ramat-Gan, Israel (*Magna Cum Laude*).

Industry Experience

- 2015 **Data Scientist**, *Turi*.
- 2015 **Data Scientist**, *Sizmek*.
- 2014–2015 **Chief Data Scientist**, *Grid4c*.
- 2011–2015 **Researcher and Project Manager**, *Telekom Innovation Laboratories*.
- 2013–2014 **Member of eBay Big Data Lab**, *first cycle Nov. 2013 - Feb. 2014*.

- 2012–2013 **Data Scientist**, *Voyager Labs*.
2004–2010 **Data Scientist**, *Academic Reserve*.
2005–2007 **Researcher and Developer**, *Algosec*.

Honors, Awards, and Academic Achievements

- 2017 Won the **Microsoft Azure Research Award**
- 2016 Won the **Best Commercialization Potential Pitch Award**, Washington Research Foundation (WRF) Perfect Pitch and Poster Contest
- 2016 Won the **UW CSE Postdoc Research Award**
- 2016 Received the **AWS Cloud Credits for Research Grant**
- 2015 Won the **Washington Research Foundation Innovation Postdoctoral Fellowship in Data Science**
- 2015 Won the **Moore/Sloan Data Science Postdoctoral Fellowship**
- 2014 Invited to join the second **Heidelberg Laureate Forum**
- 2014 Won the Information System Engineering Department at Ben-Gurion University prize for **excellence in research**
- 2014 Co-authored the article “Predicting Students’ Exam Scores by Analyzing Social Network Data” which was selected as **one of the most viewed articles** in Academia.edu (March 2014)
- 2013 Selected to be a **member of eBay Big Data Lab**
- 2013 Co-authored the article “The Social Amplifier – Reaction of Human Communities to Emergencies” which was selected as **one of the most viewed articles** in Academia.edu (August 2013)
- 2013 Won the Information System Engineering Department at Ben-Gurion University prize for **excellence in research**
- 2012 Chosen for the **Rector’s Award** as the top Ph.D. candidate at Ben-Gurion University (**only 4 out of the 1,300 Ph.D. students** won this prize this year).
- 2012 Co-authored the paper titled “Strangers Intrusion Detection - Detecting Spammers and Fake Profiles in Social Networks Based on Topology Anomalies,” which was accepted as a **selected paper - top 3%** - to the International Conference on Social Informatics 2012. overall acceptance Rate: 11.5%.
- 2012 Reached the **HCIR 2012 Challenge Finals** with my research team
- 2012 Achieved **Finalist status in Ramon Breakthrough** - Singularity University Scholarship Contest
- 2011 Reached 8th (out of 119 research teams) in the World IJCNN Social Network Challenge
- 2004 Graduated M.Sc. with honors at the age of 21 (GPA: 95)
- 2002 Received **Dean’s Award** in Computer Science and Mathematics
- 2001 Awarded Israel’s **Chess Team Championship**, as a team member (U-20)
- 1999 Awarded Israel’s **Chess Championship** (U-15)

Professional Activities

Professional Service

- Reviewer Elsevier Information Sciences, ACM Transactions on Intelligent Systems and Technology (TIST), Elsevier Information Systems, Elsevier Engineering Applications of Artificial Intelligence, Elsevier Computer Networks, ACM Transactions on Internet Technology (TOIT), International Journal of Network Management, ACM Journal of Data and Information Quality (JDIQ), Springer International Journal of Machine Learning and Cybernetics, and Springer Journal of Computer Science and Technology
- PC Member SBP-BRiMS 2017, Netsci-X 2017, SBP-BRiMS 2016, SOTICS 2016, SOTICS 2015, SBP 2015, SOTICS 2014, SocialCom 2014, SBP 2014, SOTICS 2013, SocialCom 2013, SBP 2013, and SocialCom 2012

Invited Talks

- 2016 “Fake Profile Identification – Making Online Social Networks Safer,” Washington Research Foundation (WRF) Perfect Pitch and Poster Contest, Seattle
- 2015 “Computational Genealogy,” UWPA, Annual Research Symposium, Seattle
- 2015 “Computational Genealogy,” 35th IAJGS International Conference on Jewish Genealogy, Jerusalem, Israel
- 2015 “Online Social Networks Security and Privacy,” INFO 2015, The 30th Annual Conference & Exhibition, Tel-Aviv, Israel
- 2013 “Organization Mining and Intrusion Using Online Social Networks,” 40 WATT Next Generation Summit National Security from the Perspective of Generation, The Institute for National Security Studies (INSS), Tel-Aviv, Israel
- 2013 “Social Networks Organizational Intrusion and Link Prediction,” Yahoo Labs, Haifa, Israel
- 2012 “Children in Online Social Networks,” Child Welfare Committee, the Knesset, Jerusalem, Israel
- 2011 “The Social Firewall,” Ramon Breakthrough - Singularity University Scholarship finals, Peres Center for Peace, Tel Aviv-Yafo, Israel

Teaching and Student Supervision

Research Students

- 2014-2017 Dimitry Kagan (M.Sc., Information Systems Engineering, BGU)
Research Topic: Malicious Profile Identification in Online Social Networks
Joint supervisor: Yuval Elovici
- 2014-2016 Aviad Elishar (M.Sc., Information Systems Engineering, BGU)
Research Topic: Organizational Social Network Security
Joint supervisor: Yuval Elovici

Teaching

- 2011–2012 Teaching Assistant, *Computers and Networks Security*, Undergraduate Ben-Gurion University
- 2004 Teaching Assistant *Modern Algebra 2*, Undergraduate, Bar-Ilan University
- 2004 Teaching Assistant *Modern Algebra 1*, Undergraduate, Bar-Ilan University

Development Skills

Programming Languages	Python, JavaScript, Java, C#, PHP, R, Perl, C++, C, Scala
Data Science Frameworks	GraphLab, Scikit-learn, AWS, Hadoop, Hive, MongoDB, Weka, D3

Publications

- Number of Citations: **600** ◦ Academia.edu Document Views: **41,000+**
- H-Index: 15

Journal Publications

- **Michael Fire** and Rami Puzis, “Organization Data Mining Using Social Networks,” *Springer Networks and Spatial Economics (NETS)*, 16(2), pp. 545–578, 2016
Impact factor (ISI 2016): 3.25
Journal Ranking: 15/83 (Q1) Operations Research & Management Science
- Olga Peled, **Michael Fire**, Lior Rokach, and Yuval Elovici, “Matching Entities Across Online Social Networks,” *Elsevier Neurocomputing*, 2016
Impact factor (ISI 2016): 3.317
Journal Ranking: 24/133 (Q1) Computer Science, Artificial Intelligence
- Aviad Elishar, **Michael Fire**, Dima Kagan, and Yuval Elovici, “Guided Social-bots: Infiltrating the Social Networks of Specific Organizations’ Employees,” *AI Communications*, 29 (1), pp. 87–106, 2016. (**Invited Paper**)
Impact factor (ISI 2016): 0.654
Journal Ranking: 116/133 (Q4) Computer Science, Artificial Intelligence
- **Michael Fire**, Roy Goldschmidt, and Yuval Elovici, “Online Social Networks Threats and Solutions,” *IEEE Communications Surveys & Tutorials*, 16(4), pp. 2019–2036, 2014
Impact factor (ISI 2016): 17.188
Journal Ranking: 1/146 (Q1) Computer Science, Information Systems
- **Michael Fire** and Yuval Elovici, “Data Mining of Online Genealogy Datasets for Revealing Lifespan Patterns in Human Population” *ACM Transactions on Intelligent Systems and Technology (TIST)*, 6(2), 2015
Impact factor (ISI 2016): 3.196
Journal Ranking: 26/133 (Q1) Computer Science, Artificial Intelligence
- **Michael Fire**, Dima Kagan, Aviad Elishar, and Yuval Elovici, “Friends or Foe? Fake Profile Identification in Online Social Networks,” *Springer Journal of Social Network Analysis and Mining (SNAM)*, 4(194), pp. 1027–1043, 2014
- **Michael Fire**, Lena Tenenboim, Rami Puzis, Ofrit Lesser, Lior Rokach, and Yuval Elovici, “Computationally Efficient Link Prediction in a Variety of Social Networks,” *ACM Transactions on Intelligent Systems and Technology (TIST)*, 5 (10), 2013
Impact factor (ISI 2016): 3.196
Journal Ranking: 26/133 (Q1) Computer Science, Artificial Intelligence

- Yaniv Altshuler, **Michael Fire**, Erez Shmueli, Yuval Elovici, Alfred Bruckstein, Alex (Sandy) Pentland, and David Lazer, “The Social Amplifier – Reaction of Human Communities to Emergencies,” *Journal of Statistical Physics*, 152(3), pp. 399–418, 2013. (**Invited Paper**)
Impact factor (ISI 2016): 1.349
Journal Ranking: 28/53 (Q3) Physics, Mathematical
- **Michael Fire**, Gilad Katz, and Yuval Elovici, “Strangers Intrusion Detection – Detecting Spammers and Fake Profiles in Social Networks Based on Topology Anomalies,” *ASE Human Journal*, 2012
Accepted as a selected paper - top 3% - to the International Conference on Social Informatics 2012. Overall acceptance rate: 11.5%.

Peer-Reviewed Conference Papers

- **Michael Fire** and Jonathan Schler. “Exploring Online Ad Images Using a Deep Convolutional Neural Network Approach,” *The 3rd IEEE International Conference on Smart Data (SmartData)*, Exeter, UK, June 2017
- Dima Kagan, **Michael Fire**, and Yuval Elovici, “Finding a needle in a haystack: detecting outliers in complex networks,” *NetSci-X*, Tel Aviv, Israel, January 2017
- Dima Kagan, **Michael Fire**, Aviad Elishar, and Yuval Elovici, “Facebook Applications Installation and Removal– Temporal Analysis,” *The Third International Conference on Social Eco-Informatics (SOTICS)*, Lisbon, Portugal, November 2013 (**Acceptance Rate: 29%**)
- Olga Peled, **Michael Fire**, Lior Rokach, and Yuval Elovici, “Entity Matching in Online Social Networks,” *ASE/IEEE International Conference on Social Computing (SocialCom)*, Washington, D.C., USA, September 2013 (**Acceptance Rate: 9.9%**)
- Yaniv Altshuler, **Michael Fire**, Erez Shmueli, Yuval Elovici, Alfred Bruckstein, Alex (Sandy) Pentland, and David Lazer, “The Social Amplifier – Reaction of Human Communities to Emergencies,” *Third Conference on the Analysis of Mobile Phone Datasets (NetMob 2013)*, MIT, Cambridge, MA, USA, May 2013
- Yaniv Altshuler, **Michael Fire**, Nadav Aharony, Zeev Volkovich, Yuval Elovici, and Alex (Sandy) Pentland, “Trade-offs in Social and Behavioral Modeling in Mobile Networks,” *The 2013 International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction (SBP 2013)*, Washington, D.C., USA, April 2013
- Yaniv Altshuler, **Michael Fire**, Erez Shmueli, Yuval Elovici, Alfred Bruckstein, Alex (Sandy) Pentland, and David Lazer, “Detecting Anomalous Behaviors Using Structural Properties of Social Networks,” *The 2013 International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction (SBP 2013)*, Washington, D.C., USA, April 2013
- Aviad Elishar, **Michael Fire**, Dima Kagan, and Yuval Elovici, “Organizational Intrusion: Organization Mining using Socialbots,” *International Conference on Cyber Security (CyberSec)*, Washington, D.C., USA, December 2012 (**Acceptance Rate: 9.6%**)
- **Michael Fire**, Gilad Katz, Yuval Elovici, Bracha Shapira, and Lior Rokach, “Predicting Students’ Exam Scores by Analyzing Social Network Data,” *The International Conference on Active Media Technology (AMT)*, Springer LNCS, Macau, December 2012

- **Michael Fire**, Dima Kagan, Rami Puzis, Lior Rokach, and Yuval Elovici, “Data Mining Opportunities in Geosocial Networks for Improving Road Safety,” *IEEE 27th Convention of Electrical and Electronics Engineers in Israel*, Eilat, Israel, November 2012
- **Michael Fire**, Dima Kagan, Aviad Elishar and Yuval Elovici, “Social Privacy Protector – Protecting Users’ Privacy in Social Networks,” *The Second International Conference on Social Eco-Informatics (SOTICS)*, Venice, Italy, October 2012 (**Acceptance Rate: 28%**)
- Yehonatan Bitton, **Michael Fire**, Dima Kagan, Bracha Shapira, Lior Rokachm, and Judit Bar-Ilan, “Social Network Based Search for Experts,” *The Sixth Symposium on Human-Computer Interaction and Information Retrieval (HCIR)*, IBM Research, Cambridge, MA, USA, October 2012 (**HCIR Challenge 2012 Finalist**)
- Yaniv Altshuler, Alex (Sandy) Pentland, Alfred Bruckstein, **Michael Fire**, Yuval Elovici, and David Lazer, “Real World Anomalous Events Detection Based on Social Signals in Mobile Network Traffic,” *The International School and Conference on Complex Networks (NetSci)*, Northwestern University, Evanston, IL, USA, June 2012
- Yaniv Altshuler, **Michael Fire**, Nadav Aharony, Yuval Elovici, and Alex (Sandy) Pentland, “How Many Makes a Crowd? On the Correlation between Groups’ Size and the Accuracy of Modeling,” *Social Computing Behavioral Modeling and Prediction (SBP)*, Volume 7227, pp. 43–52, University of Maryland, College Park, MD, USA, April 2012
- **Michael Fire**, Lena Tenenboim, Ofrit Lesser, Rami Puzis, Lior Rokach, and Yuval Elovici, “Link Prediction in Social Networks using Computationally Efficient Topological Features,” *IEEE Third International Conference on Social Computing (SocialCom)*, pp. 73–80, MIT, Boston, MA, USA, October 2011 (**Acceptance Rate: 9.8%**)
- **Michael Fire**, “Statistics on Signed Permutations,” *The 18th International Conference on Formal Power Series & Algebraic Combinatorics (FPSAC)*, San Diego, CA, USA, June 2006

Peer-Reviewed Workshop Papers

- Aviad Elishar, **Michael Fire**, Dima Kagan, and Yuval Elovici, “Homing Socialbots: Intrusion on a Specific Organization’s Employee Using Socialbots,” *International Workshop on Social Network Analysis in Applications (SNAA)*, co-located with ASONAM 2013, Niagara Falls, Canada, August 2013
- Yaniv Altshuler, Nadav Aharony, **Michael Fire**, Yuval Elovici, and Alex (Sandy) Pentland, “Incremental Learning with Accuracy Prediction of Social and Individual Properties from Mobile-Phone Data,” *First International Workshop on Wide Spectrum Social Signal Processing (WS³P)*, co-located with SocialCom 2012, Amsterdam, The Netherlands, September 2012

Theses and Book Chapters

- Ph.D. Thesis ◦ **Michael Fire**, *Ph.D. Thesis*, “Social Network Data Analytics using Machine Learning and Graph Theory Algorithms,” 2013
- M.Sc. Thesis ◦ **Michael Fire**, *M.Sc. Thesis*, “Statistics on Wreath Products,” 2004

Book Chapter ◦ **Michael Fire**, Rami Puzis, and Yuval Elovici, “Link Prediction in Highly Fractional Data Sets,” *Handbook of Computational Approaches to Counterterrorism*, pp. 283-300, Springer, 2013

Book Chapter ◦ **Michael Fire**, Gilad Katz, Lior Rokach, and Yuval Elovici, “Links Reconstruction Attack Using Link Prediction Algorithms to Compromise Social Networks Privacy,” *Security and Privacy in Social Networks*, Springer, pp. 283-300, 2012

Published Technical Reports

- Dima Kagan, **Michael Fire**, and Yuval Elovici, “Generic Anomalous Vertices Detection Utilizing a Link Prediction Algorithm,” 2017
- **Michael Fire** and Carlos Guestrin, “Time Is of the Essence: Analyzing the Effect of Vertex-Joining Time on Complex Network Evolution,” 2016
- **Michael Fire**, Thomas Chesney, and Yuval Elovici, “Quantitative Analysis of Genealogy Using Digitised Family Trees,” 2015
- Thomas Chesney and **Michael Fire**, “Diffusion Through Networks of Heterogenous Nodes in a Population Characterized by Homophily,” 2015

Papers in Progress

- **Michael Fire**, Rami Puzis, Dima Kagan, and Yuval Elovici, “Identifying Shill Bidders in E-commerce Platforms”

Patents

- **Michael Fire**, Gilad Katz, and Yuval Elovici, “Social Fake Profiles Detectors,” 2017 (US Patent 9,659,185)
- **Michael Fire** and Johnathan Schler, “A System and Method for Improving Image-Based Advertisement Success, 2016” (pending patent registration no. 61/614,006)
- **Michael Fire**, Dima Kagan, Aviad Elishar, and Yuval Elovici, “Method for Protecting User Privacy in Social Networks” (pending patent registration no. 13/688,276)
- **Michael Fire**, Rami Puzis, and Yuval Elovici, “System and Method for Determining by an External Entity the Human Hierarchical Structure of an Organization, Using Public Social Networks, 2013” (pending patent registration no. 30,157)

Media Coverage of Research Results

Research Title	Date	Publication
Organization Mining using Online Social Networks	April 2013 April 2013 March 2013	NY Times Tecnoetica MIT Technology Review
The Social Amplifier	August 2013 July 2013 July 2013	Academia.edu Blog The Jerusalem Post IEEE Spectrum
Friends or Foe? Fake Profile Identification in Online Social Networks	August 2012 July 2012 July 2012 July 2012 July 2012 July 2012 July 2012 July 2012	Israel21c Facerooks Fox News NBC News NDTV Tech2 Think Digit The Times of Israel
Predicting Student's Exam Scores by Analyzing Social Network Data	March 2014 December 2012 December 2012 December 2012 December 2012 December 2012	Academia.edu Blog CTV News Nocamels NRG Maariv Science Daily Phys.ORG
Data Mining Opportunities in Geosocial Networks for Improving Road Safety	January 2013 January 2013 January 2013 January 2013 January 2013 January 2013 December 2013 December 2013 December 2013	Gigaom IBN JUF News The Times of Israel UPI Yahoo! India News Haaretz Globes The Jerusalem Post
Data Mining of Online Genealogy Datasets for Revealing Lifespan Patterns in Human Population	December 2013	The Physics arXiv Blog
Homing Socialbots	September 2013	Infosec Institute

References

Available upon request