

## Michail (Michael) Mathioudakis - Curriculum Vitae

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CONTACT INFORMATION

<b>Full Name</b>	Michail Mathioudakis
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### PROFESSIONAL EXPERIENCE

#### ACADEMIA / RESEARCH

**Aalto University** 2013/08 - Present  
Postdoctoral Researcher.

- Conducted research on *online polarization, urban computing, graph algorithms*.
- Introduced and taught courses on *modern database systems* and *social web mining*.
- Advised PhD, Master's and Bachelor's students on degree theses and course projects.
- Served as journal reviewer and program committee member.
- Served as Aalto representative for the SoBigData EU project ([www.sobigdata.eu](http://www.sobigdata.eu)).

**University of Toronto** 2006/08 - 2013/07  
Teaching Assistant.

Delivered labs and tutorials on Java, Python, Advanced Database Systems, System Modeling and Analysis.

**Microsoft Research, Search Labs, California** 2010/05 - 2010/08  
Research Intern.  
Performed geolocation analysis on Twitter data.

**Yahoo! Research, Barcelona** 2009/06 - 2009/09  
Research Intern.  
Led the team that developed SPINE, an algorithm that identifies a backbone of social networks.

#### INDUSTRY

**Helvia.io** 2017/01 - Present  
Data Scientist (part-time).  
Consultant in data analysis projects.

**Sometrik** 2016/04 - 2016/12  
Data Scientist (part-time).  
Projects related to *graph simplification, inference of user demographics, burst detection* on Twitter and Facebook.

### EDUCATION

**University of Toronto** 2006/08 - 2013/07  
Doctor of Philosophy (Ph.D.) in Computer Science.  
Thesis on '*Detecting Prominent Patterns of Activity in Social Media*'.  
Supervisor: Prof. Nick Koudas (University of Toronto).  
Committee: Prof. Peter Marbach, Prof. Vassos Hadzilacos (University of Toronto).  
External examiner: Prof. Panos Ipeirotis (New York University).

**National Technical University of Athens** 2001/09 - 2006/07  
Diploma of Engineering (D.Eng.) in Electrical and Computer Engineering.  
Thesis on '*Workload-aware wavelet synopses for point and range-sum queries*'.  
Supervisor: Prof. Timos Sellis, Advisor: Dimitris Sacharidis.

TEACHING  
EXPERIENCE

INSTRUCTOR

**Modern Database Systems.** CS-E4610 Spring 2017.  
Graduate course (Master's Level).  
Computer Science Department, Aalto University.  
*Curriculum:* Join algorithms & query optimization in Relational Database Systems.  
Document Databases (MongoDB). Map-Reduce and Big Data platforms (Apache Spark).  
*Co-instructor:* Prof. Aristides Gionis.  
URL: <https://mycourses.aalto.fi/course/view.php?id=13082>

**Modern Database Systems.** CS-E5040 Spring 2016.  
Graduate course (Master's Level).  
Computer Science Department, Aalto University.  
*Curriculum:* As above.  
Co-instructor: Prof. Aristides Gionis.  
URL: <https://mycourses.aalto.fi/course/view.php?id=6082>

**Mining the Social Web.** T-61.6020 Spring 2015.  
Graduate seminar course (Master's Level).  
Computer Science Department, Aalto University.  
*Curriculum:* Structure & Dynamics of Social Networks. Online Politics. Financial Sentiment. Urban Computing.  
*Co-instructor:* Prof. Aristides Gionis.  
URL: <https://michalis.co/work/mining-the-social-web/>

ACADEMIC ADVISOR

**Advisor to Master's (MSc) Theses**

- Clemens Westrup's MSc thesis (2016), supported by Sanoma.  
Title: 'An Exploration of Representation Learning and Sequential Modeling Approaches for Supervised Topic Classification in Job Advertisements'.  
URL: <http://urn.fi/URN:NBN:fi:aalto-201611025476>
- Julien Blegean's MSc thesis (2015).  
Title: 'Twitter the Rioter : Analyzing roles through a protest on social media. What was your part during the 2014 Ferguson riots?'  
URL: <http://urn.fi/URN:NBN:fi:aalto-201506303586>
- Géraud Le Falher's MSc thesis (2014).  
Title: 'Finding similar neighborhoods across cities by mining human urban activity'.  
URL: <http://www.urn.fi/URN:NBN:fi:aalto-201408292551>

**Advisor to Bachelor's (BSc) Theses**

- Miika Rantakaulio's BSc thesis (2017).  
Topic: 'A Facebook bot for place recommendation'.  
Under submission.
- Jere Vaara's BSc thesis (2016).  
Topic: 'Developing chat bots'.  
URL: <http://urn.fi/URN:NBN:fi:aalto-201702152406>

### Advisor to Student Research Projects

Served as advisor at Aalto University for:

- Frederick Ayala's two research projects (2017 and 2016).  
Topic: 'Foursquare recommendations for User Groups'.  
Results under submission to an international conference.
- Ian Qihang Gu's research project (2017).  
Topic: 'Biases in Foursquare activity'.  
Results under submission to an international conference.
- Munira Khamitova's research project (2017).  
Topic: 'Foursquare user classification'.
- Emre Çelikten's research project (2015-16).  
Topic: 'Sparse topic modeling for geotagged activity'.  
The collaboration resulted into a journal article in the IEEE Transactions on Big Data and a demonstration at WWW.
- Harry Mavroforakis's research internship (Summer 2014).  
Topic: 'Absorbing-random-walk centrality'.  
The collaboration resulted into a publication at the International Conference on Data Mining (ICDM 2015).
- Karmen Dykstra's research project (2014).  
Topic: 'Extracting lines of work from citation data'.

### PARTICIPATION IN COLLECTIVE PROJECTS

**EC H2020 RIA project "SoBigData" (654024)** Since September 2015, I have acted as Aalto representative for the "SoBigData" research project. Aalto participates in the project with two research groups: the Data Mining Group, under Prof. Aristides Gionis, and the Complex Networks Group, under Prof. Kimmo Kaski.

### EVALUATION OF RESEARCH

#### COMMITTEE MEMBER

I have served as Committee Member for the following conferences and workshops.

#### Conferences

- Conference on Information and Knowledge Management (CIKM),
- International Conference on Data Mining (ICDE),
- International Conference on Web and Social Media (ICWSM),
- Knowledge and Information Systems (KAIS),
- ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD),
- International World Wide Web Conference (WWW),
- International Conference on Web Search and Data Mining (WSDM).

#### Workshops

- Workshop on Social News On the Web (SNOW),
- Workshop on Social Media and Risk (SoMeRis).

#### JOURNAL REVIEWER

I have served as reviewer for the following journals.

- ECML PKDD Journal (DAMI),
- Information Retrieval Journal (INRT),
- Internet Mathematics,
- Journal of Very Large Databases (VLDB Journal),
- Transactions on Knowledge and Data Engineering (TKDE),
- Transactions on Dependable and Secure Computing (TDSC),
- Transactions on Information Systems (TOIS),
- Transactions on Parallel & Distributed Systems (TPDS).

PEER-REVIEWED JOURNAL ARTICLES

- Emre Çelikten, Géraud Le Falher, and Michael Mathioudakis. Modeling urban behavior by mining geotagged social data. **IEEE Transactions on Big Data (TBD)** (2016). DOI: <https://doi.org/10.1109/TBDDATA.2016.2628398>
- Gionis, Aristides, Michael Mathioudakis, and Antti Ukkonen. Bump hunting in the dark: Local discrepancy maximization on graphs. **IEEE Transactions on Knowledge and Data Engineering (TKDE)** (2016). DOI: <https://doi.org/10.1109/TKDE.2016.2571693>

PEER-REVIEWED CONFERENCE ARTICLES, POSTERS, DEMONSTRATION PROPOSALS

- Michael Mathioudakis, Kiran Garimella, Gianmarco De Francisci Morales, Aristides Gionis. 2017. The Effect of Collective Attention on Controversial Debates on Social Media. In the 9th International ACM **Web Science Conference (WebSci'17)**.
- Frederick Ayala, B. Daróczy, Michael Mathioudakis, A. Benczur, A. Gionis. 2017. Where could we go? Recommendations for groups in location-based social networks.. In the 9th International ACM **Web Science Conference (WebSci'17)**.
- Michael Mathioudakis, Kiran Garimella, Gianmarco De Francisci Morales, Aristides Gionis. 2017. The Ebb and Flow of Controversial Debates on Social Media. Poster. In 11th AAAI Conference on **Web and Social Media (ICWSM 2017)**.
- Kiran Garimella, Gianmarco De Francisci Morales, Aristides Gionis, and Michael Mathioudakis. 2017. Exploring Polarized Consumption of News Online. In the Proceedings of the 26th International Conference Companion on **World Wide Web (WWW 2017)**. International World Wide Web Conferences Steering Committee, 2017.
- Kiran Garimella, Gianmarco De Francisci Morales, Aristides Gionis, and Michael Mathioudakis. 2017. Reducing Controversy by Connecting Opposing Views. In the Proceedings of the Tenth ACM International Conference on **Web Search and Data Mining (WSDM '17)**. ACM, New York, NY, USA, 81-90. DOI: <https://doi.org/10.1145/3018661.3018703>  
**Best Student Paper.**
- Emre Çelikten, Géraud Le Falher, and Michael Mathioudakis. What Is the City but the People?: Exploring Urban Activity Using Social Web Traces. In the Proceedings of the 25th International Conference Companion on **World Wide Web (WWW 2016)**, pp. 167-170. International World Wide Web Conferences Steering Committee, 2016. DOI: <https://doi.org/10.1145/2872518.2901922>
- Kiran Garimella, Gianmarco De Francisci Morales, Aristides Gionis, and Michael Mathioudakis. 2016. Quantifying Controversy in Social Media. In the Proceedings of the Ninth ACM International Conference on **Web Search and Data Mining (WSDM '16)**. ACM, New York, NY, USA, 33-42. DOI: <https://doi.org/10.1145/2835776.2835792>
- Kiran Garimella, Michael Mathioudakis, Gianmarco De Francisci Morales, and Aristides Gionis. 2016. Exploring Controversy in Twitter. In the Proceedings of the 19th ACM Conference on **Computer Supported Cooperative Work and Social Computing Companion (CSCW '16 Companion)**. ACM, New York, NY, USA, 33-36. DOI: <https://doi.org/10.1145/2818052.2874318>
- Géraud Le Falher, Aristides Gionis, and Michael Mathioudakis. Where is the Soho of Rome? Measures and algorithms for finding similar neighborhoods in cities. In the 9th AAAI Conference on **Web and Social Media (ICWSM 2015)**.
- Indre Zliobaite, Michael Mathioudakis, Tuukka Lehtiniemi, Pekka Parviainen, and Tomi Janhunen. 2015. Accessibility by public transport predicts residential real

estate prices: a case study in Helsinki region. In the Proceedings of the 2nd International Conference on **Mining Urban Data (MUD'15)**, Vol. 1392. CEUR-WS.org, Aachen, Germany, Germany, 65-71.

- Mavroforakis, Charalampos, Michael Mathioudakis, and Aristides Gionis. Absorbing random-walk centrality: Theory and algorithms. In 2015 IEEE International Conference on **Data Mining (ICDM 2015)**, pp. 901-906. IEEE, 2015. DOI: <http://dx.doi.org/10.1109/ICDM.2015.103>
- Gionis, Aristides, Michael Mathioudakis, and Antti Ukkonen. Bump hunting in the dark: Local discrepancy maximization on graphs. In the Proceedings of the IEEE 31st International Conference on **Data Engineering (ICDE 2015)**, pp. 1155-1166. IEEE, 2015. DOI: <https://doi.org/10.1109/ICDE.2015.7113364>
- Michael Mathioudakis, Francesco Bonchi, Carlos Castillo, Aristides Gionis, and Antti Ukkonen. 2011. Sparsification of influence networks. In the Proceedings of the 17th ACM SIGKDD international conference on **Knowledge discovery and data mining (KDD '11)**. ACM, New York, NY, USA, 529-537. DOI: <http://dx.doi.org/10.1145/2020408.2020492>  
**Citations: ACM 30, Google Scholar 116.**
- Michael Mathioudakis and Nick Koudas. 2010. TwitterMonitor: trend detection over the twitter stream. In the Proceedings of the 2010 ACM SIGMOD International Conference on **Management of data (SIGMOD '10)**. ACM, New York, NY, USA, 1155-1158. DOI: <http://dx.doi.org/10.1145/1807167.1807306>  
**Citations: ACM 155, Google Scholar 642.**
- Michael Mathioudakis, Nilesh Bansal, and Nick Koudas. 2010. Identifying, attributing and describing spatial bursts. **Proc. VLDB Endowment** 3, 1-2 (September 2010), 1091-1102. DOI: <http://dx.doi.org/10.14778/1920841.1920978>
- Michael Mathioudakis, Nick Koudas, and Peter Marbach. 2010. Early online identification of attention gathering items in social media. In Proceedings of the third ACM international conference on **Web search and data mining (WSDM '10)**. ACM, New York, NY, USA, 301-310. DOI: <http://dx.doi.org/10.1145/1718487.1718525>
- Michael Mathioudakis and Nick Koudas. 2009. Efficient identification of starters and followers in social media. In the Proceedings of the 12th International Conference on **Extending Database Technology: Advances in Database Technology (EDBT '09)**. ACM, New York, NY, USA, 708-719. DOI: <http://dx.doi.org/10.1145/1516360.1516442>
- Michael Mathioudakis, Dimitris Sacharidis, and Timos Sellis. 2006. A study on workload-aware wavelet synopses for point and range-sum queries. In the Proceedings of the 9th ACM international workshop on **Data warehousing and OLAP (DOLAP '06)**. ACM, New York, NY, USA, 27-34. DOI: <http://dx.doi.org/10.1145/1183512.1183519>

#### NON-REFEREED ARTICLES

- Social Media Analysis. Michael Mathioudakis. **Springer Encyclopedia of Database Systems**. [To appear].

#### SEMINARS AND INVITED TALKS

- “Polarization on Social Media”. Invited talk at the **International Workshop on Machine Learning for Large Scale Networks, Alaska, USA, May 2017**.
- “Polarization on Social Media”. Invited lecture for the course **Machine Learning and Modelling for Social Networks, ETH, Zurich, May 2017**.

- “Polarization on Social Media”. Tutorial at the 11th AAAI Conference on **Web and Social Media (ICWSM 2017)**. Montreal, Canada, May 2017. With Kiran Garimella, Gianmarco De Francisci Morales, Aristides Gionis.
- “Urban Computing”. Invited talk at **Elisa (elisa.fi)**, Helsinki, Finland, December 2016.
- “Expert Finding in Social Networks”. Invited talk at **Futurice (futurice.com)**, Helsinki, Finland, December 2016.
- “Visualizing Twitter Discussions with NetworkX”. Seminar talk at the **Python Conference (PyCon) Finland**, Helsinki, Finland, November 2016. With Kiran Garimella. URL: <https://youtu.be/rGRuhVKd3D4>.
- “Social Media Analysis”. Invited talk at **Sanoma (sanoma.com)**, Helsinki, Finland, December 2015.
- “Absorbing Random Walk Centrality”. Invited talk at **Inria, Lille**, France, May 2015.

## RESEARCH THEMES

### **Social Media Analysis** (2006 - 2013; PhD thesis)

Goal: identify major patterns of activity on social media.

Individual projects aim to:

- Identify ‘trending’ discussions on social media.
- Identify geographically focused discussions.
- Identify information-propagation backbones of social networks.
- Detect early individual items posted on the Web (e.g., status messages or pictures) that attract a lot of user attention.
- Identify users who tend to lead online discussions (‘starters’) and ones who tend to react to content posted by others (‘followers’).

### **Urban Computing** (2013 - Today)

Goal: understand and improve how citizens experience their cities.

Individual projects aim to:

- Analyze activity on location-based social networks (LBSNs) to learn models of urban activity (who in a city spends time where, when, doing what).
- De-bias data gathered from LBSNs to accurately represent urban activity.
- Identify similar regions across different cities.
- Generate place recommendations for groups of people.
- Study how public transport affects prices in the housing market of Helsinki.

### **Polarization on Social Media** (2013 - Today)

Goal: study polarization, controversies and echo chambers on social media.

Individual projects aim to:

- Quantify the polarization of Twitter discussions.
- Generate recommendations to minimize ‘echo chamber’ effects.
- Study the evolution of online debates over long-lasting controversial issues (e.g., related to healthcare, abortion rights, and gun control in the USA).

### **Graph Analysis** (2013 - Today)

Goal: develop algorithms for abstract graph problems.

Individual projects aim to:

- Identify subgraphs that maximize linear discrepancy measures on nodes.
- Identify nodes with maximum absorbing-random-walk centrality.
- Effectively monitor Markov-chain traffic by observing the state of a small number of nodes.