

## UNIVERSITY OF LJUBLJANA

Faculty of Computer and Information Science  
Laboratory for Data Technologies  
Večna pot 113, SI-1000 Ljubljana  
Slovenia

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## RESEARCH INTERESTS

### NETWORK SCIENCE | PRIMARY RESEARCH AREA

Structure and dynamics of complex social, information & technological networks, machine learning with graphs  
Methods and algorithms for network modeling, sampling & comparison, clustering & partitioning, link analysis  
Applications in bibliometrics & scientometrics, fraud & anomaly detection, software engineering

### DATA SCIENCE | OTHER FIELDS OF INTEREST

Selected areas of data analysis, data mining, stream mining, statistics

## EDUCATION

### PhD | COMPUTER AND INFORMATION SCIENCE

University of Ljubljana | Faculty of Computer and Information Science  
Thesis "Detecting groups of nodes in networks using label propagation" | Advisor **Marko Bajec**  
Course grade average: 9.82 / 10.0 | Thesis grade: 10  
Oct 2008 – June 2013

### DIPLOMA [BSc] | COMPUTER SCIENCE AND MATHEMATICS

University of Ljubljana | Faculty of Computer and Information Science & Faculty of Mathematics and Physics  
Diploma "Detecting fraud based on the analysis of social networks" | Advisors **Marko Bajec** & **Matjaž Kukar** | **Prešeren award**  
Course grade average: 9.78 / 10.0 | Diploma grade: 10 | Summa Cum Laude  
Oct 2004 – Sep 2008

## POSITIONS

### ASSOCIATE PROFESSOR | COMPUTER AND INFORMATION SCIENCE

University of Ljubljana | Faculty of Computer and Information Science  
Oct 2022 – Oct 2027

### RESEARCH FELLOW | METHODOLOGY, STATISTICS AND INFORMATICS

University of Ljubljana | Faculty of Social Sciences  
Jan 2018 – Dec 2025

### TEACHER & ASSISTANT

University of Ljubljana | Faculty of Computer and Information Science  
Oct 2015 – & July – Dec 2013

### [POSTDOCTORAL] RESEARCHER

University of Ljubljana | Faculty of Computer and Information Science  
Oct 2008 – June 2015

## FUNDING

Slovenian Ministry of Education, Science and Sport & European Union, European Social Fund  
Development of algorithms for network analysis in large company | Funding awarded **73,152 €**  
Jan 2014 – June 2015

## AWARDS & HONORS

- 2017 **UNIVERSITY AWARD** | University of Ljubljana | Young university professors
- 2012 **NATIONAL AWARD** | Slovenian Research Agency | Journal publication
- 2011 **FACULTY AWARD** | University of Ljubljana | Faculty of Computer and Information Science | Journal publication
- 2008 **PREŠEREN AWARD** | University of Ljubljana | Faculty of Computer and Information Science | BSc thesis
- 2008 **1ST PLACE** | University of California, San Diego | Data Mining Contest | Undergraduate division
- 2006 **RECTOR'S LIST** | University of Ljubljana | Top university students
- 2005 – 08 **DEAN'S LIST** | University of Ljubljana | Faculty of Computer and Information Science | Top faculty students
- 2000 – 08 **ZOIS FELLOWSHIP** | Slovene Human Resources and Scholarship Fund | Top national students

## TALKS & SEMINARS

- “Network abstraction with backbones and skeletons: Spanning trees versus convex skeletons” | Department seminar (**Imperial College London**, Centre for Complexity Science, 2022) | Host **Tim Evans**
- “On computing spanning trees of unweighted networks” | *Wednesday Seminar* (University of Ljubljana, Faculty of Mathematics and Physics, 2021) | Host **Vladimir Batagelj**
- “Intermediacy of publications: Uncovering important publications for the development of a field” | At: *6th European Conference on Statistical Network Science COSTNET* (online, 2020)
- “Label propagation for clustering” | At: *6th Slovenian Conference on Network Science NetSlo* (Ljubljana, Slovenia, 2020)
- “Intermediacy of publications” | At: *5th Slovenian Conference on Network Science NetSlo* (Ljubljana, Slovenia, 2019)
- “Intermediacy of publications” | *AI Seminar* (University of Ljubljana, Faculty of Computer and Information Science, 2019) | Host **Marko Robnik-Šikonja**
- “Convexity in complex networks” | *LCN2 Seminar* (**Leiden University**, Institute of Advanced Computer Science, 2017) | Host **Frank W. Takes**
- “Network analysis in bibliometrics” | Department seminar (**Leiden University**, Centre for Science and Technology Studies, 2017) | Host **Vincent Traag**
- “On convexity in complex networks” | At: *6th International Workshop on Social Network Analysis ARS* (Naples, Italy, 2017)
- “Should you (not) publish in computer science journals?” | *Cookie Seminar* (University of Ljubljana, Faculty of Computer and Information Science, 2017) | Host **Sebastijan Šprager**
- “Comparison of methods for clustering scientific publications based on citations” | *IBMI Seminar* (University of Ljubljana, Faculty of Medicine, 2017) | Host **Nataša Kejžar**
- “Reliability of bibliographic databases for scientometrics network analysis” | At: *8th International Conference on Information Technologies and Information Society ITIS* (Šmarješke toplice, Slovenia, 2016)
- “On convexity in complex networks” | *Wednesday Seminar* (University of Ljubljana, Faculty of Mathematics and Physics, 2016) | Host **Vladimir Batagelj**
- “Network analysis vs WikiLeaks” | *Cookie Seminar* (University of Ljubljana, Faculty of Computer and Information Science, 2015) | Host **Janez Demšar**
- “Selected topics from network analysis” | *Wednesday Seminar* (University of Ljubljana, Faculty of Mathematics and Physics, 2014) | Host **Vladimir Batagelj**
- “Network analysis” | Habilitation lecture (University of Ljubljana, Faculty of Computer and Information Science, 2014) | Host **Igor Kononenko**
- “Network and link analysis” | Department seminar (**University of West Bohemia**, Department of Computer Science and Engineering, 2014) | Host **Dalibor Fiala**
- “Detecting groups of nodes in networks by label propagation” | Invited lecture (Faculty of Information Studies in Novo mesto, 2014) | Host **Zoran Levnajc**
- “An expert system for detecting automobile insurance fraud using social network analysis” | Invited talk (Slovenian Academy of Sciences and Arts, 2013) | **National award**
- “Detecting insurance fraud using network analysis” | *Seminar for Probability, Statistics and Financial Mathematics* (University of Ljubljana, Faculty of Mathematics and Physics, 2013) | Host **Aleš Toman**
- “Structured-world conjecture: On modules and communities in real-world networks” | Group seminar (**Stanford University**, Computer Science Department, 2012) | Host **Jure Leskovec**
- “Structured-world conjecture: On modules and communities in real-world networks” | *AI Seminar* (**University of California, San Diego**, Department of Computer Science and Engineering, 2012) | Host **Charles Elkan**
- “Introduction to data networks analysis” | Invited lecture (University of Ljubljana, Faculty of Computer and Information Science, 2010) | Host **Marko Bajec**

# PUBLICATIONS & PATENTS

## JOURNAL PUBLICATIONS

- Romi Koželj, **Lovro Šubelj** & Jurij Bajc | “Methods for representing earthquake time series with networks” | *Informatica* 48(14), 1-26 (2024)
- Žiga Babnik, Jasmina Pegan, Domen Kos & **Lovro Šubelj** | “Generating lyrics using constrained random walks on a word network” | *Informatica* 48(1), 131-140 (2024)
- Milan Jović, **Lovro Šubelj**, Tea Golob, Matej Makarovič, Taha Yasseri, Danijela Boberić Krstićev, Srdjan Škrbić & Zoran Levnajić | “Terrorist attacks sharpen the binary perception of “Us” vs. “Them”” | *Scientific Reports* 13, 12451 (2023)
- Vincent Traag & **Lovro Šubelj** | “Large network community detection by fast label propagation” | *Scientific Reports* 13, 2701 (2023)
- Tim Poštuvan, Semir Salkić & **Lovro Šubelj** | “Learning-based link prediction analysis for Facebook100 network” | *Uporabna Informatika* 29(2), 83-94 (2021)
- Ilya Makarov, Dmitry Kiselev, Nikita Nikitinsky & **Lovro Šubelj** | “Survey on graph embeddings and their applications to machine learning problems on graphs” | *PeerJ Computer Science* 7, e357 (2021)
- Anej Svete, Jakob Hostnik & **Lovro Šubelj** | “It is not just about the melody: How Europe votes for its favorite songs” | *Uporabna Informatika* 28(2), 66-84 (2020)
- Jaka Stavanja, Matej Klemen & **Lovro Šubelj** | “Predicting kills in Game of Thrones using network analysis” | *Uporabna Informatika* 28(2), 55-65 (2020)
- **Lovro Šubelj**, Ludo Waltman, Vincent Traag & Nees Jan van Eck | “Intermediacy of publications” | *Royal Society Open Science* 7(1), 190207 (2020)
- Luka Naglič & **Lovro Šubelj** | “War pact model of shrinking networks” | *PLoS ONE* 14(10), e0223480 (2019)
- **Lovro Šubelj**, Dalibor Fiala, Tadej Ciglarič & Luka Kronegger | “Convexity in scientific collaboration networks” | *Journal of Informetrics* 13(1), 10-31 (2019)
- Vitjan Zavrtanik & **Lovro Šubelj** | “Community detection in Slovene public spending” | *Uporabna Informatika* 26(3), 107-117 (2018)
- Jaka Šircelj, Romi Koželj & **Lovro Šubelj** | “Effects of species extinction on ecosystems stability” | *Uporabna Informatika* 26(3), 118-127 (2018)
- **Lovro Šubelj** | “Convex skeletons of complex networks” | *Journal of the Royal Society Interface* 15(145), 20180422 (2018)
- Tilen Marc & **Lovro Šubelj** | “Convexity in complex networks” | *Network Science* 6(2), 176-203 (2018)
- Neli Blagus, **Lovro Šubelj** & Marko Bajec | “Empirical comparison of network sampling: How to choose the most appropriate method?” | *Physica A* 477, 136-148 (2017)
- **Lovro Šubelj** & Dalibor Fiala | “Publication boost in Web of Science journals and its effect on citation distributions” | *JASIST* 68(4), 1018-1023 (2017)
- **Lovro Šubelj**, Nees Jan van Eck & Ludo Waltman | “Clustering scientific publications based on citation relations: A systematic comparison of different methods” | *PLoS ONE* 11(4), e0154404 (2016)
- **Lovro Šubelj**, Marko Bajec, Biljana M. Boshkoska, Andrej Kastrin & Zoran Levnajić | “Quantifying the consistency of scientific databases” | *PLoS ONE* 10(5), e0127390 (2015)
- Neli Blagus, **Lovro Šubelj**, Gregor Weiss & Marko Bajec | “Sampling promotes community structure in social and information networks” | *Physica A* 432, 206-215 (2015)
- Dalibor Fiala, **Lovro Šubelj**, Slavko Žitnik & Marko Bajec | “Do PageRank-based author rankings outperform simple citation counts?” | *Journal of Informetrics* 9(2), 334-348 (2015)
- **Lovro Šubelj**, Dalibor Fiala & Marko Bajec | “Network-based statistical comparison of citation topology of bibliographic databases” | *Scientific Reports* 4, 6496 (2014)
- **Lovro Šubelj**, Slavko Žitnik, Neli Blagus & Marko Bajec | “Node mixing and group structure of complex software networks” | *Advances in Complex Systems* 17(7), 1450022 (2014)
- Neli Blagus, **Lovro Šubelj**, Aljaž Zrnc, Marko Janković & Marko Bajec | “Preserving properties under simplification of social networks” | *Uporabna Informatika* 22(3), 127-136 (2014) | In Slovene
- Neli Blagus, **Lovro Šubelj** & Marko Bajec | “Assessing the effectiveness of real-world network simplification” | *Physica A* 413, 134-146 (2014)
- Slavko Žitnik, **Lovro Šubelj** & Marko Bajec | “SkipCor: Skip-mention coreference resolution using linear-chain conditional random fields” | *PLoS ONE* 9(6), e100101 (2014)
- Marko Janković, Slavko Žitnik, **Lovro Šubelj**, Neli Blagus, Aljaž Zrnc & Marko Bajec | “Improvement of software development method with minimal involvement of developers” | *Uporabna Informatika* 22(1), 3-11 (2014) | In Slovene
- **Lovro Šubelj** & Marko Bajec | “Group detection in complex networks: An algorithm and comparison of the state of the art” | *Physica A* 397, 144-156 (2014)
- **Lovro Šubelj**, Slavko Žitnik, Marko Janković, Bojan Klemenc, Aleš Kumer, Aljaž Zrnc & Marko Bajec | “Large real-world networks” | *Uporabna Informatika* 21(2), 107-115 (2013) | In Slovene
- Slavko Žitnik, **Lovro Šubelj**, Dejan Lavbič, Olegas Vasilecas & Marko Bajec | “General context-aware data matching and merging framework” | *Informatica* 24(1), 119-152 (2013)

- Dejan Lavbič, Slavko Žitnik, **Lovro Šubelj**, Aleš Kumer, Aljaž Zrnc & Marko Bajec | “Traversal and relations discovery among business entities and people using semantic web technologies and trust management” | *Databases and Information Systems* 7, 164-174 (2013)
- Aljaž Zrnc, Dejan Lavbič, **Lovro Šubelj**, Slavko Žitnik, Aleš Kumer & Marko Bajec | “NoSQL databases” | *Uporabna Informatika* 20(3), 164-172 (2012) | In Slovene
- **Lovro Šubelj** & Marko Bajec | “Ubiquitousness of link-density and link-pattern communities in real-world networks” | *European Physical Journal B* 85(1), 32 (2012) | **Editors' highlight**
- Neli Blagus, **Lovro Šubelj** & Marko Bajec | “Self-similar scaling of density in complex real-world networks” | *Physica A* 391(8), 2794-2802 (2012)
- **Lovro Šubelj** & Marko Bajec | “Robust network community detection using balanced propagation” | *European Physical Journal B* 81(3), 353-362 (2011)
- **Lovro Šubelj** & Marko Bajec | “Community structure of complex software systems: Analysis and applications” | *Physica A* 390(16), 2968-2975 (2011)
- **Lovro Šubelj** & Marko Bajec | “Unfolding communities in large complex networks: Combining defensive and offensive label propagation for core extraction” | *Physical Review E* 83(3), 036103 (2011) | **Faculty award**
- **Lovro Šubelj**, Štefan Furlan & Marko Bajec | “An expert system for detecting automobile insurance fraud using social network analysis” | *Expert Systems with Applications* 38(1), 1039-1052 (2011) | **National award**
- Bojan Klemenc, Peter Ciuha, **Lovro Šubelj** & Marko Bajec | “Visual and aural: Visualization of harmony in music with color” | *IPSI BgD Transactions on Internet Research* 7(1), 48-53 (2011)
- **Lovro Šubelj**, David Jelenc, Eva Zupančič, Dejan Lavbič, Denis Trček, Marjan Krisper & Marko Bajec | “Merging data sources based on semantics, contexts and trust” | *IPSI BgD Transactions on Internet Research* 7(1), 18-30 (2011)

## PUBLICATION PREPRINTS

- **Lovro Šubelj** | “Computing well-balanced spanning trees of unweighted networks” | e-print *arXiv:2205.06628v2*, pp. 18
- **Lovro Šubelj** & Marko Bajec | “Clustering assortativity, communities and functional modules in real-world networks” | e-print *arXiv:1202.3188v1*, pp. 21

## CONFERENCE PUBLICATIONS

- Vid Stropnik & **Lovro Šubelj** | “Predicting successful passes in football: Benchmark dataset and GNN ablation study” | In: *Proceedings of the 20th International Conference on Network Science NetSci* (Maastricht, Netherlands, 2025), p. 1
- Vincent Traag & **Lovro Šubelj** | “Fast label propagation algorithm for community detection” | In: *Proceedings of the 18th International Conference on Network Science NetSci* (Vienna, Austria, 2023), p. 1
- Nejc Rožman, Marko Corn, Gašper Škulj, Janez Diaci & **Lovro Šubelj** | “Emergence of a scale-free network topology in a blockchain-based shared manufacturing” | In: *Proceedings of the 3rd International Conference on Blockchain Computing and Applications BCAA* (Tartu, Estonia, 2021), pp. 172-178
- **Lovro Šubelj** | “Spanning trees that preserve network distances” | In: *Proceedings of the 1st Joint Sunbelt and NetSci Conference Networks* (Washington D.C., USA, 2021), pp. 270-271
- Luka Naglič & **Lovro Šubelj** | “War pact network model: A generative model of networks that shrink” | In: *Proceedings of the 4th European Social Networks Conference EUSN* (Zurich, Switzerland, 2019), p. 240
- **Lovro Šubelj**, Ludo Waltman, Vincent Traag & Nees Jan van Eck | “Intermediacy of publications” | In: *Proceedings of the 17th International Conference on Informetrics and Scientometrics ISSI* (Rome, Italy, 2019), pp. 1288-1300
- **Lovro Šubelj**, Ludo Waltman, Vincent Traag & Nees Jan van Eck | “Intermediacy of publications” | In: *Proceedings of the 5th International Conference on Computational Social Science IC<sup>2</sup>S<sup>2</sup>* (Amsterdam, Netherlands, 2019), pp. 1-3
- **Lovro Šubelj**, Ludo Waltman, Vincent Traag & Nees Jan van Eck | “Uncovering important intermediate publications” | In: *Proceedings of the 38th INSNA International Social Network Conference Sunbelt* (Utrecht, Netherlands, 2018), p. 1
- **Lovro Šubelj** | “Convex skeleton: Generalization of a network spanning tree” | In: *Proceedings of the 1st NetSci Workshop on Large and Rich Network Structures LaRichNet* (Paris, France, 2018), p. 1
- **Lovro Šubelj**, Ludo Waltman, Vincent Traag & Nees Jan van Eck | “Intermediacy of publications” | In: *Proceedings of the 13th International Conference on Network Science NetSci* (Paris, France, 2018), p. 1
- Tilen Marc & **Lovro Šubelj** | “Three forms of convexity in graphs and networks” | In: *Proceedings of the 2nd European Conference on Statistical Network Science COSTNET* (Palma de Mallorca, Spain, 2017), p. 54
- Marko Mišić, Dražen Drašković, **Lovro Šubelj** & Marko Bajec | “Parallel implementation of the label propagation method for community detection on the GPU” | In: *Proceedings of the 26th International Electrotechnical and Computer Science Conference ERK* (Portorož, Slovenia, 2017), pp. 359-362
- **Lovro Šubelj** & Tilen Marc | “On convexity in complex networks” | In: *Proceedings of the 8th International Conference on Complex Networks CompleNet* (Dubrovnik, Croatia, 2017), pp. 14-16
- **Lovro Šubelj**, Nees Jan van Eck & Ludo Waltman | “Comparison of methods for clustering citation networks” | In: *Proceedings of the 2nd International Conference on Network Science X NetSci-X* (Wrocław, Poland, 2016), p. 1
- **Lovro Šubelj** | “Exploratory and predictive tasks of network community detection” | In: *Proceedings of the 10th International Conference on Network Science NetSci* (Zaragoza, Spain, 2015), p. 1

- **Lovro Šubelj**, Dalibor Fiala & Marko Bajec | “Consistency of citation topology of bibliographic databases” | In: *Proceedings of the 10th International Conference on Network Science NetSci* (Zaragoza, Spain, 2015), p. 1
- **Lovro Šubelj** | “Large network community detection in practical scenarios” | In: *Proceedings of the 5th International Workshop on Social Network Analysis ARS* (Capri, Italy, 2015), p. 78
- **Lovro Šubelj** & Marko Bajec | “Network group discovery by hierarchical label propagation” | In: *Proceedings of the 1st European Social Networks Conference EUSN* (Barcelona, Spain, 2014), p. 284
- **Lovro Šubelj**, Zoran Bosnić, Matjaž Kukar & Marko Bajec | “Automatization of the stream mining process” | In: *Proceedings of the 26th International Conference on Advanced Information Systems CAISE* (Thessaloniki, Greece, 2014), pp. 409-423
- **Lovro Šubelj**, Slavko Žitnik & Marko Bajec | “Who reads and who cites? Unveiling author citation dynamics by modeling citation networks” | In: *Proceedings of the 9th International Conference on Network Science NetSci* (Berkeley, California, USA, 2014), p. 1
- **Lovro Šubelj**, Gregor Weiss, Neli Blagus & Marko Bajec | “What coins the bitcoin? Exploratory analysis of bitcoin market value by network group discovery” | In: *Proceedings of the 9th International Conference on Network Science NetSci* (Berkeley, California, USA, 2014), p. 1
- Neli Blagus, **Lovro Šubelj**, Gregor Weiss & Marko Bajec | “Large networks grow smaller: How to choose the right simplification method?” | In: *Proceedings of the 9th International Conference on Network Science NetSci* (Berkeley, California, USA, 2014), p. 1
- Slavko Žitnik, **Lovro Šubelj**, Marko Janković, Bojan Furlan, Dražen Drašković, Nemanja Kojić, Marko Mišić & Marko Bajec | “Iterative end-to-end information extraction based on linear models” | In: *Proceedings of the 22nd International Electrotechnical and Computer Science Conference ERK* (Portorož, Slovenia, 2013), pp. 47-50
- Miloš Pavković, Dražen Drašković, **Lovro Šubelj**, Slavko Žitnik, Dejan Lavbič, Marko Janković, Jelica Protić & Boško Nikolić | “Intelligent techniques for searching Internet forums” | In: *Proceedings of the 22nd International Electrotechnical and Computer Science Conference ERK* (Portorož, Slovenia, 2013), pp. 85-88
- **Lovro Šubelj**, Marko Bajec & Neli Blagus | “Group extraction for real-world networks: The case of communities, modules, and hubs and spokes” | In: *Proceedings of the 8th International Conference on Network Science NetSci* (Copenhagen, Denmark, 2013), pp. 152-153
- Neli Blagus, Marko Bajec & **Lovro Šubelj** | “Preserving properties under simplification of real-world networks” | In: *Proceedings of the 8th International Conference on Network Science NetSci* (Copenhagen, Denmark, 2013), p. 166
- **Lovro Šubelj** & Marko Bajec | “Model of complex networks based on citation dynamics” | In: *Proceedings of the 2nd WWW Workshop on Large Scale Network Analysis LSNA* (Rio de Janeiro, Brazil, 2013), pp. 527-530
- Slavko Žitnik, **Lovro Šubelj**, Dejan Lavbič, Aljaž Zrnec & Marko Bajec | “Collective information extraction using first-order probabilistic models” | In: *Proceedings of the 5th Balkan Conference in Informatics BCI* (Novi Sad, Serbia, 2012), pp. 279-282
- **Lovro Šubelj** & Marko Bajec | “Software systems through complex networks science: Review, analysis and applications” | In: *Proceedings of the 1st KDD Workshop on Software Mining SoftMine* (Beijing, China, 2012), pp. 9-16
- Dejan Lavbič, Slavko Žitnik, **Lovro Šubelj**, Aleš Kumer, Aljaž Zrnec & Marko Bajec | “Traversal and relations discovery among business entities and people using semantic web technologies and trust management” | In: *Proceedings of the 10th International Baltic Conference on Databases and Information Systems DB&IS* (Vilnius, Lithuania, 2012), pp. 11
- **Lovro Šubelj**, Slavko Žitnik, Aljaž Zrnec, Aleš Kumer, Bojan Klemenc, Dejan Lavbič & Marko Bajec | “Properties of large real-world networks and some applications” | In: *Zbornik 19. konference Dnevi slovenske informatike DSI* (Portorož, Slovenia, 2012), pp. 10 | In Slovene
- Aljaž Zrnec, Dejan Lavbič, **Lovro Šubelj**, Slavko Žitnik, Aleš Kumer & Marko Bajec | “NoSQL databases” | In: *Zbornik 19. konference Dnevi slovenske informatike DSI* (Portorož, Slovenia, 2012), pp. 10 | In Slovene
- Marko Bajec, Štefan Furlan, Aleš Kumer, **Lovro Šubelj**, Slavko Žitnik & Dejan Lavbič | “Supervisor+” | In: *Zbornik 3. konference Informatika v javni upravi IJU* (Brdo pri Kranju, Slovenia, 2011), pp. 6 | In Slovene
- **Lovro Šubelj** & Marko Bajec | “Generalized network community detection” | In: *Proceedings of the 1st ECML PKDD Workshop on Finding Patterns of Human Behaviors in Network and Mobility Data NEMO* (Athens, Greece, 2011), pp. 66-84
- **Lovro Šubelj**, Neli Blagus, Štefan Furlan, Bojan Klemenc, Aleš Kumer, Dejan Lavbič, Aljaž Zrnec, Slavko Žitnik & Marko Bajec | “Complex networks analysis: Introduction and applications” | In: *Zbornik 2. konference Informatika v javni upravi IJU* (Brdo pri Kranju, Slovenia, 2010), pp. 10 | In Slovene
- Slavko Žitnik, Bojan Klemenc, Dejan Lavbič, **Lovro Šubelj**, Štefan Furlan, Aleš Kumer, Aljaž Zrnec, Neli Blagus & Marko Bajec | “Trends in intelligent data retrieval from heterogeneous data sources” | In: *Zbornik 2. konference Informatika v javni upravi IJU* (Brdo pri Kranju, Slovenia, 2010), pp. 12 | In Slovene
- **Lovro Šubelj** & Marko Bajec | “Unfolding network communities by combining defensive and offensive label propagation” | In: *Proceedings of the 1st ECML PKDD Workshop on the Analysis of Complex Networks ACNE* (Barcelona, Spain, 2010), pp. 87-104
- Bojan Klemenc, Peter Ciuha, **Lovro Šubelj** & Marko Bajec | “Visual and aural: Visualization of harmony in music with color” | In: *Proceedings of the Symposia on Internet Related Research VIPSI* (Tivat, Montenegro, 2010), pp. 6
- **Lovro Šubelj**, David Jelenc, Eva Zupančič, Dejan Lavbič, Denis Trček, Marjan Krisper & Marko Bajec | “Merging data sources based on semantics, contexts and trust” | In: *Proceedings of the Symposia on Internet Related Research VIPSI* (Amalfi, Italy, 2010), pp. 13

- Lovro Šubelj, Štefan Furlan & Marko Bajec | “Detecting fraud based on the analyses of social networks” | In: *Zbornik 16. konference Dnevi slovenske informatike DSI* (Portorož, Slovenia, 2009), pp. 10 | In Slovene
- Giovanni Godena, Janez Tancek, Igor Steiner, David Čuk, Lovro Šubelj, Jože Grilj & Peter Kosin | “LiteBatch: A tool for batch process control on the PLC platform” | In: *Zbornik 5. konference Avtomatizacija v industriji in gospodarstvu AIG* (Maribor, Slovenia, 2007), pp. 51-56 | In Slovene

## BOOK CHAPTERS

- Lovro Šubelj | “Label propagation for clustering” | In: *Advances in Network Clustering and Blockmodeling* (Wiley, New York, 2020), pp. 121-150

## PRESS COVERAGE

- Mojca Vizjak Pavšič | “Zakaj je Drnovšek premagal Bulca” | *Delo* (February 21, 2019) | In Slovene
- Mojca Vizjak Pavšič | “NetSlo’17 o znanosti 21. stoletja” | *Delo* (February 9, 2017) | In Slovene
- Lovro Šubelj & Jernej Ule | “Bruci, vstopate v razburljivi del življenja. Lp, vaš profesor” | *Delo* (October 1, 2014) | In Slovene
- Uroš Škerl Kramberger | “George ne bo shodil brez države” | *Dnevnik* (March 28, 2013) | In Slovene

## PATENTS & APPLICATIONS

- Lovro Šubelj & Marko Bajec | “The process for allocation of computational resources in networks of distributed devices” | *Slovenian Institute of Intellectual Property SI-24553-A* (Ljubljana, Slovenia, 2015), P-201300392, pp. 5 | In Slovene
- Lovro Šubelj, Slavko Žitnik, Dejan Lavbič, Aleš Kumer & Marko Bajec | “Combining heterogeneous data sources of data processing devices” | *Slovenian Institute of Intellectual Property* (Ljubljana, Slovenia, 2013), P-201300263, pp. 7 | In Slovene

## SERVICE TO PROFESSION

### SCIENTIFIC AFFILIATION

- 2020 – Slovenian Association for Computing Machinery SACM
- 2020 – Association for Computing Machinery ACM
- 2015 – Slovenian Network Science Society **NetSlo**
- 2014 – Network Science Society **NetSci**
- 2010 – Slovenian Informatics Society SDI
- 2009 – Slovenian Artificial Intelligence Society SLAIS

### JOURNAL EDITORIAL

- 2021 – **Entropy** | Topic editor
- 2017 – **PLoS ONE** | Academic editor
- 2015 – *Journal of Computer Science and Engineering* | Editorial board

### JOURNAL ADVISORY

- 2024 *Journal of Computational Science* (Elsevier) | Reviewer
- 2016 | 24 **PLoS ONE** (Public Library of Science) | Regular reviewer
- 2023 *Journal of Classification* (Springer) | Reviewer
- 2019 | 23 **Quantitative Science Studies** (MIT Press) | Regular reviewer
- 2014 | 20 | 22 **Scientific Reports** (Nature Publishing Group) | Regular reviewer
- 2014 | 21 **Social Network Analysis and Mining** (Springer) | Regular reviewer
- 2020 **Journal of the Royal Society Interface** (Royal Society Publishing) | Reviewer
- 2016 | 17 | 20 **Scientometrics** (Springer) | Regular reviewer
- 2016 | 17 | 20 **Journal of Informetrics** (Elsevier) | Regular reviewer
- 2015 | 18 | 20 **Entropy** (Multidisciplinary Digital Publishing Institute) | Regular reviewer
- 2017 | 19 **Journal of Complex Networks** (Oxford University Press) | Regular reviewer
- 2018 **IEEE Access** (IEEE) | Reviewer
- 2012 – 18 **Physica A** (Elsevier) | Regular reviewer
- 2017 **European Physical Journal B** (Springer) | Reviewer
- 2017 *Italian Journal of Applied Statistics* (Padua) | Reviewer
- 2017 *Journal of Computer Science and Engineering* (Peertechz) | Reviewer
- 2017 *Communications in Mathematical and in Computer Chemistry* (MATCH) | Reviewer
- 2016 **Social Networks** (Elsevier) | Reviewer
- 2016 **Expert Systems with Applications** (Elsevier) | Reviewer

2016 *IEEE Transactions on Neural Networks and Learning Systems* (IEEE) | Reviewer  
 2015 *IEEE Transactions on Cybernetics* (IEEE) | Reviewer  
 2015 *Neural Computing and Applications* (Springer) | Reviewer  
 2014 *Journal of Systems and Software* (Elsevier) | Reviewer  
 2014 *Modern Physics Letters B* (World Scientific) | Reviewer  
 2013 | 14 *International Journal of Modern Physics C* (World Scientific) | Regular reviewer  
 2013 **Advances in Complex Systems** (World Scientific) | Reviewer  
 2013 **Knowledge-Based Systems** (Elsevier) | Reviewer  
 2012 *Chinese Physics B* (IOP Publishing) | Reviewer  
 2011 – 15 *Journal of Computer Science and Technology* (Springer) | Regular reviewer  
 2010 *International Journal of Information System Modeling and Design* (IGI Publishing) | Reviewer  
 2010 | 19 – 21 *Uporabna Informatika* (SDI) | Regular reviewer

## CONFERENCE COMMITTEE

2025 *International Conference on Network Science* **NetSci** | Program committee  
 2017 – 25 *Slovenian Conference on Network Science* **NetSlo** | Organizing committee | With many others  
 2023 – 25 *International Conference on Web Search and Data Mining* **WSDM** | Program committee  
 2022 – 24 *ECML PKDD Workshop on Mining and Learning With Graphs* **MLG** | Program committee  
 2023 | 24 *International Conference on Complex Networks and their Applications* **CNA** | Program committee  
 2022 | 23 *The Web Conference* **Web** | Program committee  
 2022 *Student Computing Research Symposium* **SCORES** | Organizing committee | With many others  
 2021 *International Conference on Modeling and Analysis of Complex Systems and Processes* **MACSPro** | Program committee  
 2021 *The Web Conference* **Web** | Local volunteers chair  
 2015 | 16 *Networking Slovenian Networkers* **MSN** | Organizing committee | With many others  
 2014 – 19 *International Conference on Information and Software Technologies* **ICIST** | Program committee  
 2014 – 18 *International Conference on Research Challenges in Information Science* **RCIS** | Program & poster committee  
 2014 – 18 *International Conference on Information Technologies and Information Society* **ITIS** | Program committee  
 2012 | 18 *International Baltic Conference on Databases and Information Systems* **DB&IS** | Program committee  
 2017 *International Electrotechnical and Computer Science Conference* **ERK** | Program committee  
 2009 – 11 | 15 *International Conference on Advanced Information Systems* **CAiSE** | Additional reviewer

## CONFERENCE ATTENDANCE

2014 | 15 | 18 | 22 | 23 | 25 *International Conference on Network Science* **NetSci**  
 2017 – 20 | 23 | 24 *Slovenian Conference on Network Science* **NetSlo**  
 2014 | 19 | 23 *European Social Networks Conference* **EUSN**  
 2022 | 23 *Learning on Graphs Conference* **LoG**  
 2021 *The Web Conference* **Web**  
 2021 *International Joint Sunbelt and NetSci Conference* **Networks**  
 2016 | 17 | 20 *European Conference on Statistical Network Science* **COSTNET**  
 2017 *International Conference on Complex Networks* **CompleNet**  
 2016 *International Conference on Network Science X* **NetSci-X**  
 2015 | 17 *International Workshop on Social Network Analysis* **ARS**  
 2015 | 16 *Networking Slovenian Networkers* **MSN**  
 2013 *International World Wide Web Conference* **WWW**  
 2012 *SIAM International Conference on Data Mining* **SDM**  
 2012 *ACM SIGKDD International Conference on Knowledge Discovery and Data Mining* **KDD**  
 2009 – 11 *European Conference on Machine Learning & [...] Knowledge Discovery [...]* **ECML PKDD**  
 2015 | 16 *International Conference on Information Technologies and Information Society* **ITIS**  
 2012 *Balkan Conference in Informatics* **BCI**  
 2009 | 12 *Dnevi slovenske informatike* **DSI**  
 2010 *Informatika v javni upravi* **IJU**  
 2009 *Summer School on the Analysis of Patterns* **AP**

# TEACHING EXPERIENCE

## LECTURER

### ADVANCED TOPICS IN NETWORK SCIENCE

University of Ljubljana | Faculty of Computer and Information Science  
PhD students | Elective course | With **Jure Leskovec**  
Oct 2015 – Sep 2020

### [INTRODUCTION TO] NETWORK ANALYSIS

University of Ljubljana | Faculty of Computer and Information Science  
**YouTube** | <http://bit.ly/2I2dQBS>  
MSc students | Mandatory course  
Oct 2015 – Sep 2025

### PROGRAMMING 2

University of Ljubljana | Faculty of Mathematics and Physics  
**YouTube** | <http://bit.ly/3jRSS5B>  
BSc students | Mandatory course  
Oct 2018 – Sep 2025

### INTRODUCTION TO NETWORK ANALYSIS IN PYTHON

University of Ljubljana | Faculty of Computer and Information Science  
**GitHub** | <http://github.com/lovre/netpy22>  
Academics and professionals | Workshop  
Sep 2019 | Dec 2019 | Dec 2021 | Jan 2022 | Dec 2022 | Oct 2024

## TEACHING ASSISTANT

### MACHINE LEARNING WITH GRAPHS

University of Ljubljana | Faculty of Computer and Information Science  
BSc and MSc students | Elective course | Lecturer **Jure Leskovec**  
Oct 2013 – Sep 2025

### INTRODUCTION TO INFORMATION SYSTEMS

University of Ljubljana | Faculty of Computer and Information Science  
BSc students | Mandatory course | Lecturer **Dejan Lavbič**  
Oct 2015 – Sep 2016

### FUNDAMENTALS OF DATABASES

University of Ljubljana | Faculty of Computer and Information Science  
BSc students | Mandatory course | Lecturer **Marko Bajec**  
Oct 2011 – Sep 2022

### DATABASES 1

University of Ljubljana | Faculty of Computer and Information Science  
BSc students | Mandatory course | Lecturer **Marko Bajec**  
Oct 2008 – Sep 2011

## THESIS ADVISORY | BSc , MSc & PHD THESES

- **Vid Stropnik** | “An analysis of player-formation graphs for predicting football passes” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2024)
- **Matej Kalc** | “Automobile fraud detection with machine learning on graphs” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2024) | With **Marija Gorenc Novak**
- **Gregor Ažbe** | “Automatic invoice data extraction” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2024) | With **Slavko Žitnik**
- **Mark Bogataj** | “Leakage localization in city water distribution network” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2024)
- **Andraž Matkovič** | “The contribution of temporal information in the computation of brain functional connectivity when assessing its association with interpersonal differences in behaviour” | **PhD thesis** (University of Ljubljana, Faculty of Arts, 2024) | With **Grega Repovš**
- **Ermin Omeragić** | “Classification of financial transactions in accounting using graph neural networks” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2023)
- **Maruša Oražem** | “Modeling product stickiness in a grocery store” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2023)
- **Bisera Nikoloska** | “Network representational learning for classification of patients with neurological disorders” | BSc



- thesis (University of Ljubljana, Faculty of Computer and Information Science, 2023) | With **Andrej Kastrin**
- **Primož Gabrovec** | “Use of social network analysis algorithms on international projects applicants’ data” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2023) | With **Zoran Bosnić**
  - **Romi Koželj** | “Modeling the time evolution of seismic activity using network analysis” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2022) | With **Jurij Bajc** | **Prešeren award**
  - **Žiga Kokelj** | “Comparison of tainting analysis methods in Bitcoin network” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2021)
  - **Luka Kavčič** | “Intermediacy of nodes in networks and applications in scientometrics” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2021)
  - **Ilya Makarov** | “Methods of network embeddings and their applications” | **PhD thesis** (University of Ljubljana, Faculty of Computer and Information Science, 2021)
  - **Iza Jerman Slabe** | “Predicting hunting success of wild animals in Primorska region” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science & Faculty of Mathematics and Physics, 2021)
  - **Sara Oblak** | “Fraud detection in telecommunications using network analysis” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science & Faculty of Mathematics and Physics, 2021)
  - **Tim Poštuvan** | “Adaptive graph neural network training objective for link prediction” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science & Faculty of Mathematics and Physics, 2021)
  - **Šimen Ravnik** | “Sagittal pelvic orientation feature analysis for predicting degenerative diseases” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2021)
  - **Damir Varešanović** | “Comparison of algorithms for network community detection based on label propagation” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2021)
  - **Jure Repe** | “Predicting problem difficulty in bouldering” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2019)
  - **Simona Malenšek** | “Analysis of human symptoms-disease network” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2019)
  - **Žiga Babnik** | “Song similarity analysis based on lyrics, ratings and meta data” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2019)
  - **Nina Mrzelj** | “Link prediction in heterogenous networks by embedding nodes in the vector space” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science & Faculty of Mathematics and Physics, 2019)
  - **Elizaveta Chernenko** | “Network determinants of conflict in business organization” | MSc thesis (National Research University, Faculty of Social Sciences, 2019)
  - **Robert Dovžan** | “Predicting the click-through rate of ads using factorization machines” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2019) | With **Davorin Kopic**
  - **Luka Androjna** | “Optimization of conversions in programatic advertising” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2019) | With **Andraž Tori**
  - **Matic Tribušon** | “Properties of sports competitions and relation to market value” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2018) | With **Erik Štrumbelj**
  - **Tadej Matek** | “Anomaly detection in computer networks using higher-order dependencies” | MSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2017)
  - **Petra Smole** | “Analysis of course co-enrollment at the Faculty of Computer and Information Science” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2016)
  - **Rok Fortuna** | “Automated trading system using machine learning and technical analysis of trading” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2016) | With **Matjaž B. Jurič**
  - **Angelina Temelkovska** | “Comparison of attributes for predicting online reviews on Amazon” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2016)
  - **Vasil Krstev** | “Predicting performance of football teams using network analysis” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2016)
  - **Kristijan Mirčeta** | “Extracting temporal knowledge from events in news articles” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2015)
  - **Žiga Vučko** | “Predicting categories of news articles using meta-data from the Web” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2015)

## THESIS ASSISTANCE | BSc & PhD THESES

- **Neli Blagus** | “Effective simplification of complex real-world networks” | **PhD thesis** (University of Ljubljana, Faculty of Computer and Information Science, 2016) | Advisor **Marko Bajec**
- **Slavko Žitnik** | “Iterative semantic information extraction from unstructured text sources” | **PhD thesis** (University of Ljubljana, Faculty of Computer and Information Science, 2014) | Advisor **Marko Bajec**
- **Matjaž Hribernik** | “Predicting the outcome of badminton matches based on network analysis” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2014) | Advisor **Marko Bajec**
- **Igor Jončevski** | “Predicting business ownership based on board collaboration networks” | BSc thesis (University of

Ljubljana, Faculty of Computer and Information Science, 2014) | Advisor **Marko Bajec**

- **Nejc Gašperin** | “Web application for commuters” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2012) | Advisor **Marko Bajec**
- **Slavko Žitnik** | “Intelligent data retrieval from arbitrary data sources” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science & Faculty of Mathematics and Physics, 2012) | Advisor **Marko Bajec**
- **Mitja Kuščer** | “Random networks generation using machine learning method” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2009) | Advisor **Marko Bajec**
- **Tomaž Kuralt** | “Autonomous system for data networks integration” | BSc thesis (University of Ljubljana, Faculty of Computer and Information Science, 2009) | Advisor **Marko Bajec**

## PROJECT EXPERIENCE

### **WISDOM LABS, D.O.O. | KNOWLEDGE GRAPHS**

University of Ljubljana | Faculty of Computer and Information Science  
Development of methods and algorithms for analysis of knowledge graphs  
Industry funded project | Project leader  
Nov 2021 – Jan 2023

### **COSTNET | STATISTICAL NETWORK ANALYSIS**

University of Ljubljana | Faculty of Computer and Information Science  
European cooperation for statistics of network data science  
EU COST action | Management committee substitute  
May 2016 – May 2020

### **ARRS | IMMIGRATION AND INTEGRATION**

Faculty of Information Studies in Novo mesto  
Understanding immigration and integration through social dynamics  
ARRS basic project | Project member  
Sep 2017 – Apr 2018

### **PETROL, D.D. | BUSINESS NETWORK ANALYSIS**

University of Ljubljana | Faculty of Computer and Information Science  
Development of methods and algorithms for network analysis in large company  
Postdoctoral research project | Project leader  
Jan 2014 – June 2015

### **CELTRA, D.O.O. | ADS ANOMALY DETECTION**

University of Ljubljana | Faculty of Computer and Information Science  
Development of methods and algorithms for anomaly detection in mobile ads service  
Industry funded project | Project leader  
Apr 2014 – Mar 2015

### **STREAM MINING ENVIRONMENT**

University of Ljubljana | Faculty of Computer and Information Science  
Development and implementation of programming environment for stream mining  
Research project | Project leader  
Sep 2012 – Mar 2014

### **ISKRATEL, D.O.O. | HIGHWAY TRAFFIC SIMULATION**

University of Ljubljana | Faculty of Computer and Information Science  
Development and implementation of simulation environment for highway traffic  
Industry funded project | Package leader  
Jan – June 2012

### **OPTILAB, D.O.O. | INSURANCE FRAUD DETECTION**

University of Ljubljana | Faculty of Computer and Information Science  
Development of methods and algorithms for fraud detection in automobile insurance  
Industry funded project | Package leader  
Jan 2008 – June 2010

## **INEA, D.O.O. | BATCH PROCESS AUTOMATION**

Jožef Stefan Institute | Department of Systems and Control

Implementation of methods and algorithms for batch process automation

Industry funded project | Student work

July 2006 — June 2008

## **MEDICAL SIGNAL ANALYSIS**

Jožef Stefan Institute | Department of Communication Systems

Implementation of methods and algorithms for signal analysis in medicine

Research project | Student work

July 2005 — Sep 2005

## **IT & PROGRAMMING SKILLS**

General purpose languages: **JAVA** | **PHYTON** | **C/C++**

Scripting languages: **JAVASCRIPT** | **R** | **SHELL**

Query languages: **SQL** | **NOSQL** | **XQUERY**

Markup languages: **XHTML** | **XML** | **CSS**

Declarative languages: **PROLOG**

Numeric computation: **MATLAB**

Symbolic computation: **MATHEMATICA**

Digital typesetting: **T<sub>E</sub>X** | **L<sup>A</sup>T<sub>E</sub>X**

## **LANGUAGES**

**SLOVENE** | Native speaker

**ENGLISH** | Fluent

**CROATIAN** | Basic

**GERMAN** | Very basic

## **REFERENCES**

**JURE LESKOVEC** | **Stanford University**, Computer Science Department

**MARINKA ŽITNIK** | **Harvard University**, Department of Biomedical Informatics

**LUDO WALTMAN** | **Leiden University**, Centre for Science and Technology Studies

**VLADIMIR BATAGELJ** | University of Primorska & Institute of Mathematics, Physics and Mechanics

**LJUPČO TODOROVSKI** | University of Ljubljana, Faculty of Mathematics and Physics

**MARKO BAJEC** | University of Ljubljana, Faculty of Computer and Information Science

I was born on March 7, 1986 in Ljubljana. I am a citizen of Slovenia.