

Djordje Gligorijevic

“Research = Fun”

2145 Hamilton Avenue San Jose, CA, USA

Applied Research Manager, eBay

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Education

- **Temple University** Philadelphia, PA, USA
Doctor of Philosophy (PhD), 2013 - 2018
 - Major: Computer & Information Sciences (CIS) Dept., College of Science and Technology
 - Concentration: Machine Learning and Data Mining
 - Graduation date: July 2018
 - Dissertation title: Predictive Uncertainty Quantification and Explainable Machine Learning in Healthcare
- **University of Belgrade** Belgrade, Serbia
Bachelor of Science (B.Sc.), 2009 - 2013
 - Information systems and technologies, Faculty of Organizational Sciences
 - Graduation date: July 2013

Research Interests

My research interests encompass Machine Learning, Spatial and Temporal Data Mining, Structured Regression, Extreme Multi-Label Classification, Natural Language Processing, Large Language Models, and the Integration of Qualitative Knowledge into predictive models. I specialize in Computational Healthcare & Precision Medicine, Auction Bid Valuation & Landscape Prediction, Search, Ranking, and Recommendation Systems, along with Computational Advertising.

Work Experience

- **Applied Research Manager** eBay Inc. 2145 Hamilton Avenue San Jose, CA 95125
Search Ranking & Monetization, eBay October 2022 – present
 - Managin a team of researchers and engineers at eBay, overseeing the allocation and pricing aspects for the advanced sponsored search program. Research focuses on 1) developing response prediction machine learning models, 2) refining ranking and pricing auction mechanisms, 3) implementing predictive control mechanisms for budget pacing and auto-bidding, and 4) enhancing A/B testing platforms.
 - Research resulted in following manuscripts: [P2], [P3]
 - Patents: [PT8]
- **Senior Applied Researcher** eBay Inc. 2145 Hamilton Avenue San Jose, CA 95125
Search Ranking & Monetization, eBay November 2021 – October 2022
 - Tech lead for sponsored search allocation and pricing, responsible for charting short- and long-term research plan and planning product proposals and improvements.
 - Response prediction models for sponsored search. Developed continual learning low-latency prediction, ranking and calibration models for eBay search system based on structured and unstructured data used for ads ranking and pricing. Developed and launched model distribution system which sped up model calibration and weights refresh rate 100 times.

- Ad spend control. Developed a search system simulator with counterfactual response generator for developing and evaluating budget pacing algorithms, and implemented system for controlling ad spend in sponsored search campaigns from the ground up.

- **Research Scientist** Verizon Media, 701 1st Ave, Sunnyvale, CA 94089
Yahoo! Research, Verizon Media *July 2018 – November 2021*

- As a member of Demand Platforms R&D team: 1) Developed novel conversion prediction models for both prospective and retargeting advertising on trillions of data points, 2) Developed deep algorithms for modeling users' activity trails, and 2) Led science efforts in the bid shading project for first-price auctions bidding.
- As a member of Targeting & Insights team: 1) Developed lightweight and high performing click-through rate model, 2) Led science efforts for contextual conversion prediction and audience building products in the cookieless online world.
- Research resulted in following manuscripts: [P4], [P5], [P6], [P7], [P8], [P9], [P10], [P12]
- Patents and defensive publications: [PT1], [PT2], [PT3], [PT4], [PT5], [PT6], [PT7]

- **Academic Research Collaborator** IQVIA, 1 IMS Dr, Plymouth Meeting, PA 19462
IQVIA *September 2017 – July 2018*

- Developed novel site selection optimization system for clinical trials with the IQVIA contract research organization, based on deep models for matching clinical trials and investigators.
- Proposed novel approaches for modeling disease progression from mild cognitive impairment to Alzheimer's disease.
- Research resulted in following manuscript: [P14]

- **Research Scientist Internship** Oath, 701 1st Ave, Sunnyvale, CA 94089
Yahoo! Research *June 2017 – September 2017*

- I have re-joined Yahoo Research Ad Sciences team for the summer 2017 internship. Project I worked on was developing a deep click-through rate prediction algorithm for sponsored search and mobile app install advertisements trained on billions of data examples in a distributed environment.
- Research resulted in following manuscripts: [P13], [P17]

- **Research Scientist Internship** Yahoo! Inc., 701 1st Ave, Sunnyvale, CA 94089
Yahoo! Research *May 2016 – August 2016*

- I have joined Yahoo Research Ad Sciences team for the summer 2016 internship, during which I have worked on integrating mobile app usage events from Flurry SDK with Yahoo email receipts to provide personalized ad recommendations based on smartphone usage habits of a user. In addition, I collaborated with teammates on developing neural embedding models for location aware sponsored search.
- Research resulted in following manuscripts: [P19], [P28]

- **Research Assistant** Temple University, Philadelphia, PA, USA
Center for Data Analytics and Biomedical Informatics *Fall 2013 – Spring 2018*

My graduate research program included writing papers, monthly and quarterly reports and attending meetings and workshops on several major grants:

- DARPA funded *Prospective Analysis of Large and Complex Partially Observed Temporal Social Networks*
 - * Modelling predictive uncertainty estimation of Conditional Random Fields for evolving graphs.
 - * Research resulted in following manuscripts: [P21], [P22], [P23], [P24], [P25], [P26], [P27]

- ONR funded *Structured Regression in Complex Networks by Fusion of Qualitative Knowledge and Big Data*
 - * Fusing large scale hospital discharge records databases with medical domain knowledge sources in order to obtain novel and meaningful insights and advance precision medicine.
 - * Research resulted in following manuscripts: [P15], [P21], [P22], [P23]
- NSF funded *BIGDATA: Multi-level predictive analytics and motif discovery across massive dynamic spatio-temporal networks in complex socio-technical systems: An organizational genetics approach*
 - * Correlating comorbidity and genetic disease networks across age, gender, and geography from large scale hospital discharge records databases.
 - * Research resulted in following manuscripts: [P11], [P21], [P22], [P24]

* Awarded with Outstanding Research Assistant award by College of Science and Technology in 2018, and with gold award on the Future of Computing graduate research competition 2015 by CIS department.

Teaching Assistant

Temple University, Philadelphia, PA, USA

- *Computer and Information Sciences Dept.*

Fall 2013 – Spring 2017

Served as a teaching assistant for the following courses:

- CIS 2168: Data Structures (Spring 2017, with prof. Andrew Rosen)
- CIS 2033: Introduction to Computational Probability and Statistics (Spring – Fall 2015, with prof. Yuhong Guo, Fall 2016, with prof. Richard Beigel)
- CIS 1166: Mathematical Concepts in Computing I (Discrete Mathematics) (Spring 2016, with prof. Edward Crotty)
- CIS 0823: Math for a Digital World (Fall 2013 - Fall 2014, with prof. Richard Beigel)

* Awarded with the Outstanding Graduate Teaching Assistant award by CIS department in 2017.

Undergraduate Teaching and Research Associate University of Belgrade, Belgrade, Serbia

- *Laboratory for Multimedia Communication*

July 2012 – May 2013

- Computer networking and telecommunications – Fall 2012 class, assisting professor and teaching assistants during labs and exams.

Undergraduate Teaching and Research Associate University of Belgrade, Belgrade, Serbia

- *Laboratory for Artificial Intelligence*

October 2011 – May 2013

- Open-source development of neural network software tool: Neuroph Studio; Research on Semantic Web annotations and its applications; Assisting professors in grading during exams.

Publications

- [P1] Mikovic, R., Arsic, B., **Gligorijevic, Dj.** “Importance of social capital for knowledge acquisition – DeepLIFT learning from international development projects”. (in press) Information Processing and Management (Impact Factor: 8.6)
- [P2] Chen, Q., Nguyen, H., **Gligorijevic, Dj.** “Optimization Based Budget Pacing”. Proc. ACM The Web Conference 2024 (TheWebConf 2023), May 13. – 17. 2024, Singapore

- [P3] Nguyen, H, **Gligorijevic, Dj.**, Borah, A., Adalinge, G., Bagherjeiran, A. (2023) “*Practical Budget Pacing Algorithms and Simulation Test Bed for eBay Marketplace Sponsored Search*”, Proc AdKDD Workshop 2023 at the 29th ACM SIGKDD Conf. Knowledge Discovery and Data Mining (AdKDD 2023), August 6. - 10. 2021, Long Beach, CA, USA
- [P4] Pavlovski, M., Ravindan, S., **Gligorijevic, Dj.**, Agrawal, S., Stojkovic, I., Segura-Nunez, N., Gligorijevic, J., (2023) “*Extreme Multi-label Classification for Ad Targeting using Factorization Machines*”, Proc. 29th ACM SIGKDD Conf. Knowledge Discovery and Data Mining (KDD 2023), August 6. - 10. 2023, Long Beach, CA, USA
- [P5] **Gligorijevic, Dj.**, Gligorijevic, J., Flores, A., (2023) “*Predicting Actions of Users using Heterogeneous Online Signals*”, Big Data 3:X, 1–15, DOI: 10.1089/big.2021.0320 (Impact Factor: 2.128)
- [P6] Zhou, T., He, H., Pan, S., Karlsson, N., Shetty, B., Kitts, B., **Gligorijevic, Dj.**, Pan, J., Gultekin, S., Mao, T., Long, J., Flores, A., (2021) “*Efficient deep distribution network for bid shading in First-Price Auctions*”, Proc. 27th ACM SIGKDD Conf. Knowledge Discovery and Data Mining (KDD 2021), August 14. - 18. 2021, Virtual Event, Singapore
- [P7] **Gligorijevic, Dj.**, Gligorijevic, J., Flores, A. (2020) “*Prospective Modeling of Users for Online Display Advertising via Deep Time-Aware Model*”, In Proceedings of the 29th ACM International Conference on Information and Knowledge Management (CIKM’20), October 19–23, 2020, Virtual Event, Ireland
- [P8] **Gligorijevic, Dj.**, Zhou, T., Shetty, B., Kitts, B., Pan, S., Pan, J., Flores, A., (2020) “*Bid Shading in The Brave New World of First-Price Auctions*”, In Proceedings of the 29th ACM International Conference on Information and Knowledge Management (CIKM’20), October 19–23, 2020, Virtual Event, Ireland
- [P9] Pan, S., Kitts, B., Zhou, T., He, H., Shetty, B., Flores, A., **Gligorijevic, Dj.**, Pan, J., Mao, T., Gultekin, S., Zhang, J. (2020) “*Bid Shading by Auction Clearing Price Prediction and Fast Surplus Maximization Search*”, AdKDD workshop 2020 at the 26th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), Virtual Event, August 23, 2020
- [P10] Pavlovski, M., Gligorijevic, J., Stojkovic, I., Agrawal, S., Komirishetty, S., **Gligorijevic, Dj.**, Bhamidipati, N., Obradovic, Z. (2020) “*Time-Aware User Embeddings as a Service*” Proc. 26th ACM SIGKDD Conf. Knowledge Discovery and Data Mining (KDD 2020), San Diego, Aug. 2020.
- [P11] Zhou, F., Gillespie, A., **Gligorijevic, Dj.**, Gligorijevic, J., Obradovic, Z., (2020) “*A data-driven predictive model for chronic kidney disease progression*”, Journal of Biomedical Informatics (Impact Factor: **2.950**)
- [P12] **Gligorijevic, Dj.**, Gligorijevic, J., Flores, A. (2019) “*Time-Aware Prospective Modeling of Users for Online Display Advertising*”, AdKDD workshop 2019 at the 25th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), Anchorage, Alaska, August 5, 2019 ***Runner-up best paper award**
- [P13] Stojkovic, I., Jelisavcic, V., Gligorijevic, J., **Gligorijevic, Dj.**, Obradovic, Z. (2019) “*Decomposition Based Reparameterization for Efficient Estimation of Sparse Gaussian Conditional Random Fields*,” 36th International Conference on Machine Learning (ICML) Workshop on Tractable Probabilistic Modeling (TMP), Long Beach, CA, June 2019
- [P14] Gligorijevic, J., **Gligorijevic, Dj.**, Pavlovski, M., Milkovitz, E., Glass, L., Grier, K., Vankireddy, P., Obradovic, Z, (2019) “*Optimizing Clinical Trials Recruitment via Deep Learning*,” Journal of the American Medical Informatics Association. (Impact Factor: **4.270**)

- [P15] Ljubic, B., Gligorijevic, Dj., Gligorijevic, J., Pavlovski, M., Obradovic, Z. (2019) “ Social Network Analysis for better Understanding of Influenza,” Journal of Biomedical Informatics, vol. 93, May 2019, 103161. (Impact Factor: **2.882**)
- [P16] Mikovic, R., Arsic, B., **Gligorijevic, Dj.**, Gacic, M., Petrovic, D., Filipovic, N. (2019) “ *The influence of social capital on knowledge management maturity of nonprofit organizations - predictive modelling based on a multilevel analysis,*” IEEE Access, IEEE, pp. 47929 - 47943, 2019, April 11, doi 10.1109/ACCESS.2019.2909812.
- [P17] Gligorijevic, J., **Gligorijevic, Dj.**, Stojkovic I., Bai X., Goyal A. Obradovic, Z., “*Deeply Supervised Semantic Model for Click-Through Rate Prediction in Sponsored Search*”, Data Mining and Knowledge Discovery, Springer, 2019, April 3, doi 10.1007/s10618-019-00625-3. (Impact factor: **2.48**)
- [P18] Dokic, T., Pavlovski, M., **Gligorijevic, Dj.**, Kezunovic, M., Obradovic, Z., “ *Spatially Aware Ensemble-Based Learning to Predict Weather-Related Outages in Transmission*”, Proc. 52nd IEEE Hawaii International Conference on System Science (HICSS), Maui, Hawaii, January 2019.
- [P19] **Gligorijevic, Dj.**, Gligorijevic, J., Raghuvver A., Grbovic M., Obradovic, Z., “*Modeling Mobile User Actions for Purchase Recommendation using Deep Memory Networks*”, Proc. 41st Int’l ACM SIGIR Conf. on Research and Development in Information Retrieval (SIGIR 2018), Ann Arbor, MI, July 2018.
- [P20] **Gligorijevic, Dj.**, Stojanovic, J., Satz, W., Stojkovic, I., Schreyer, K., Del Portal, D., Obradovic, Z. “*Deep Attention for Triage of Emergency Department Patients,*” 2018 SIAM Int’l Conf. Data Mining (SDM ’18), San Diego, CA, May 2018
- [P21] **Gligorijevic, Dj.**, Stojanovic, J., Djuric N., Radosavljevic V., Grbovic M., Kulathinal R., Obradovic, Z., “*Large-Scale Discovery of Disease-Disease and Disease-Gene Associations*”, Scientific Reports, Nature Publishing Group, 2016, Aug 31, 6:32404 doi 10.1038/srep32404. (Impact Factor: **5.578**)
- [P22] **Gligorijevic, Dj.**, Stojanovic, J., Obradovic, Z., “*Discovering Disease Phenotypes from a Large Database of Inpatient Records: A Sepsis Study*”, Methods, July 28. S1046-2023(16)30232-8, doi:10.1016/j.ymeth.2016.07.021. (Impact Factor: **3.645**)
- [P23] Stojanovic, J., **Gligorijevic, Dj.**, Obradovic, Z., “*Structured Regression on Deficient Data for Predicting Customer Engagement*”, Proc. of the 25th ACM International Conference on Information and Knowledge Management (CIKM ’16), Indianapolis, United States October 24 - 28, 2016
- [P24] Stojanovic, J., **Gligorijevic, Dj.**, Radosavljevic V., Djuric N., Grbovic M., Obradovic, Z., “*Modeling Healthcare Quality via Compact Representations of Electronic Health Records*”, IEEE/ACM Transactions on Computational Biology and Bioinformatics, IEEE, 2016, July 14, doi 10.1109/TCBB.2016.2591523. (Impact Factor: 1.609)
- [P25] **Gligorijevic, Dj.**, Stojanovic, J., Obradovic, Z., “*Uncertainty Propagation in Long-term Structured Regression on Evolving Networks*”, Proc. Thirtieth AAAI Conference on Artificial Intelligence (AAAI ’16), Phoenix, AZ, February 2016.
- [P26] **Gligorijevic, Dj.**, Stojanovic, J., Obradovic, Z., “*Improving confidence while predicting trends in temporal disease networks,*” Proc. 2015 SIAM International Conference on Data Mining, Workshop on Workshop on Data Mining for Medicine and Healthcare, Vancouver, Canada, 2015

[P27] Stojanovic, J., Jovanovic, M., **Gligorijevic, Dj.**, Obradovic, Z., “*Semi-supervised learning for structured regression on partially observed attributed graphs*,” Proc. 2015 SIAM International Conference on Data Mining (SDM '15), Vancouver, Canada, 2015

In review:

[P28] Gligorijevic, J., **Gligorijevic, Dj.**, Raghuvver A., Grbovic M., Obradovic, Z., “*Location Aware Embedding for Geotargeting in Sponsored Search Advertising*”,

[P29] Stojkovic, I., Grisby, J., Lee, S., Agrawal S., Komirishetty, S., Gligorijevic, J., Bhamidipati, N., Joseph L., Ravindan, S., **Gligorijevic, Dj.**, Raghavan, N., “*Demographics Prediction for Mobile Device Users*”

Patents and Defensive Publications

[PT1] **Gligorijevic, Dj.**, Gligorijevic, J., Flores, A., “*Method and System for Time-Aware Prospective Modeling of Users for Online Display Advertising*”, US Defensive Pub. (url) 2021

[PT2] **Gligorijevic, Dj.**, Gligorijevic, J., Bhamidipati, N., Malkood, C., “*Method and System for Predicting Contextual User Information for Targeted Advertisements (Ads) and Campaigns*”, US Defensive Pub. (url) 2021

[PT3] Pan, S., Zhou, T., Kitts, B., He, H., Shetty, B., **Gligorijevic, Dj.**, Pan, J., Mao, T., Gultekin, S., Srinivasa Rao Paladugu, B., Zhang, J., Thomas, S., Flores, A., “*Bid value determination for a first-price auction*”, US Patent App. 16/994,976, (url) 2022

[PT4] Zhou, T., **Gligorijevic, Dj.**, Shetty, B., Pan, J., Kitts, B., Pan, S., Srinivasa Rao Paladugu, B., Thomas, S., Flores, A., “*Bid value determination*”, US Patent App. 16/994,930, (url) 2022

[PT5] Gligorijevic, J., Stojkovic, I., Pavlovski, M., Agrawal, S., **Gligorijevic, Dj.**, Ravindran, S., Hin-fai Tang, R., Komirishetty, S., Iyer, C., Bhamidipati, L. N., “*Time-preserving embeddings*”, US Patent App. 16/994,930, (url) 2022

[PT6] Pavlovski, M., **Gligorijevic, Dj.**, Gligorijevic, J., Stojkovic, I., Agrawal, S., Ravindan, S., Bhamidipathi, N., “*Joint Predictive Modeling of a Large Number of Targeting Segments*”, US Patent App. 17/711,547, (url) 2022

In review:

[PT7] Stojkovic, I., Grisby, J., Lee, S., Agrawal S., Komirishetty, S., Gligorijevic, J., Bhamidipati, N., Joseph L., Ravindan, S., **Gligorijevic, Dj.**, Raghavan, N., “*Demographics Prediction for Mobile Device Users*”

[PT8] **Gligorijevic, Dj.**, Borah, A., Nguyen, P. H., Chen Q., Xi, Z., Shen, S., Adalinge, G., Bagherjeiran, A., “*Optimization-Based Budget Pacing in eBay Sponsored Search*”

Awards, Grants & Honours

Runner-up Best Paper AdKDD 2019 workshop	2019
Outstanding Research Assistant Award , <i>College of Science and Technology</i> , Temple Uni.	2018
SIGIR conference Travel Award	2018
Outstanding Graduate Teaching Assistant Award , <i>CIS department</i> , Temple University	2017
Future of Computing graduate research champion , <i>CIS department</i> , Temple University	2015
Runner-up Best Doctoral Forum Poster SDM 2015	2015
SDM conference Travel Award	2015
Fellowship for Graduate Students, Republic of Serbia	2013–2017
Dean’s List of Distinguished Students	2010–2013

Extracurricular Activities & Services

My talks, attended conferences, workshops and symposiums (attendee/presenter/lecturer):

- Talk “Bid Shading in the Brave New World of First-Price Auctions” at InMobi, San Mateo, CA, September 2023
- Keynote ‘Deep Learning Methods for Modeling User Behavior in Display Advertising ’ at IEEE CCWC 2022, January 2022, Virtual
- Talk “Explainable Machine Learning in Healthcare” at City AI Kragujevac, May 2020, Virtual
- Course “Machine Learning and Data Mining in 900 minutes or less” taught to Verizon and Verizon Media’s engineering teams in Bangalore and Hyderabad, 26th Nov. 2018. – 7th Feb. 2019.
- Talk “Deep Attention Model for Triage of Emergency Department Patients” at Data Science Conference 4.0, September 2018, Belgrade, Serbia
- Talk “Modeling Uncertainty in Structured Regression” at Yahoo Research, August, 2017, Sunnyvale, CA USA
- Talk “Modeling Qualitative and Quantitative Knowledge in Health Informatics” at 2017 Sinteza conference, Singidunum University, April 21st, 2017, Belgrade, Serbia
- Talk “Predictive Modeling of Dynamic Networks” at 2016 Computational Research on-and Beyond Owlsnest (CROO) Symposium, College of Science & Technology, Temple University, April 15th, 2016, Philadelphia, PA USA
- Talk “Structured regression on partially observed evolving graphs with uncertainty propagation” at DARPA GRAPHS/SIMPLEX Workshop: Data, Algorithms and Problems on Graphs, September 28th, 2015, Columbia University, New York, NY
- DARPA GRAPHS PI Meeting/Workshop 21-24 July 2014, Arlington, VA, USA
- DARPA GRAPHS Kick-Off/Special Project Workshop 13-14 May 2014, Arlington, VA, USA
- **Attendee** on conferences: SDM ’14, ’15, AAAI ’15, SIGIR ’18, WWW ’19, ICML’20, KDD ’19, ’20, ’23
- **Reviewer**: AMIA ’16, ’17, ’18, ’20, ’21, ICDM ’17, CIKM ’21, ’22, ’23, SDM ’23, AdKDD ’19, ’20, ’21, ’22, ’23, PAKDD ’24, JBHI, BMC Bioinformatics, ScientificReports, Entropy, Applied Sciences
- **Associate Editor** for Big Data journal (impact factor: 4.426)

Organizations & Leadership:

- Trainee in Verizon Media's **SPARK** inaugural Senior Leadership Fast Track Development program (first cohort of 27 people within the company of 10,000+)
- Talent in Verizon Media's **ELEVATE** inaugural sponsorship and talent development program
- Graduate Students Faculty Search Committee for Temple University CIS Dept
- Founding member and corporate and alumni relations coordinator of the *Computer and Information Sciences Graduate Students Association* at Temple University
- FONIS – Students IT organization, starting November 2011 (now alumni)

Skills

- Programming and Markup Languages
 - **Expert:** Java, Python, MATLAB, Spark, Pig, Hive, SQL, $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$
 - **Intermediate:** Scala, C, C#, R, PHP, JavaScript
- Languages
 - Serbian – native language
 - English – proficient
- Other
 - Landscape photographer