Jasmin Bogatinovski

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Summary

I'm interested in innovating, developing and implementing machine learning methods to solve high-value practical problems and extract value from data, with 6+ years of experience. My research focus lies in the intersection of natural language applied to event data from (complex) software systems and data centres with business and technical objectives related to improving their quality in development and operation.

Education

Nov 2019 – Feb 2023 *Technical University of Berlin (TUB)* Berlin, Germany

- **Ph.D. in Computer Science** (grade: magna cum laude) supervised by Prof. Dr. Odej Kao
- Thesis: “AI-enabled Log Analysis for Improving IT System Dependability“
- In collaboration with the *Ultra-scale AIOps LAB* of ***Huawei Munich Research Center***

Oct 2017 – Oct 2019 *Jožef Stefan International Postgraduate School* Ljubljana, Slovenia

- **M.Sc. in Computer Science (GPA 9.75/10)**
- Thesis: “A comprehensive study of multi-label classification methods”
- Best conference paper award

Sep 2013 – Sep 2017 *Ss. Cyril and Methodius University* Skopje, North Macedonia

- **B.Sc. in Computer Systems Engineering Automation and Robotics (GPA 9.93/10)**
- Thesis: “Profiling Household Electricity Consumption with Machine Learning”
- Best student awards (2013/2014, 2014/2015, 2015/2016, 2016/2017)
- Best thesis award

Work Experience

1. Researcher *Technical University of Berlin* Nov 2019 – Present

- **Leading the HUAWEI-TUB Innovation LAB** as a joint research endeavour between HUAWEI and TUB to develop methods to improve the reliability of software systems.
- **Conducting research** on the polymorphic manifestation of failures in distributed and operating systems. **Developing methods** for processing **textual event descriptions** of the system behaviour (i.e., system log data) to detect and prevent failure manifestation.
- **Supervising** master and bachelor students in theses and projects.

1.1. Senior/Postdoctoral Researcher Mar 2023 – Present

- **Inventing generative AI method** for predicting RAM memory failures based on low-level hardware logs from the CPU’s registry set.

- Innovated and developed an **end-to-end machine learning system** for predicting memory failures with a **relative improvement of 10%** over existing in-house methods.

1.2. Research Collaborator *Huawei Munich Research* Nov 2019 – Present
- Implementation and evaluation of the developed algorithms in Huawei's infrastructure.
- Strategic planning for identification of novel use cases to improve system dependability.
- Reporting to the Chief AI Scientist, and various internal stakeholders of different levels of management within the **agile project** management paradigm.
- **Filing patents** for some of the developed methodologies.

1.3. Research Associate Nov 2019 – Feb 2023
- Innovated and developed a **system-agnostic NLP model** for **anomaly detection** from **textual** log data.
- Innovated an **NLP-centered methodology** for processing system-specific logs and detecting sequential, temporal and parameter anomalies.
- Innovated and developed methods for detecting log instructions with **insufficient quality** and **recommending code corrections** by an AI agent with a precision of 45 % across the source code of different systems in Huawei.

2. Research Assistant *Institute Jožef Stefan* Oct 2017 – Oct 2019
- **Conducting research** for my master's thesis, which covered the study of 28 machine learning methods on 40 datasets of different domains (**NLP**, bioinformatics, multimedia medicine), as part of the TAILOR H2020 European-funded project.
- **Collaborated** with senior researchers on various projects. Example projects include compound toxicity prediction and land-mass classification from satellite images.

Skills

Programming languages and frameworks:
- Python, PyTorch, Python Analytics Stack, Optuna, Relational Databases (SQL), MLFlow, CI/CD, Git, Docker, Hugging face hub platform

Other skills and experiences:
- Generative AI, machine learning, experimental design, statistics, recommender systems, anomaly detection from heterogeneous data

Languages:
- English (full professional proficiency), German (elementary proficiency), Macedonian (native)

Research Highlights

Selected publication list

Journals:

1. **J. Bogatinovski**, L. Todorovski, S. Džeroski, D. Kocev. *"Comprehensive comparative study of multi-label classification methods"*. (2022). Expert Systems with Applications, 203:117215, https://doi.org/10.1016/j.eswa.2022.117215. (h5 index 148, IF 8.5).
2. **J. Bogatinovski**, L. Todorovski, S. Džeroski, D. Kocev. *"Explaining the performance of multilabel classification methods with data set properties"*. (2022). International Journal of Intelligent Systems. 37: 6080-6122. doi:10.1002/int.22835, (h5 index 72, IF 8.993).

3. **J. Bogatinovski**, A. Kostovska, S. Džeroski, D. Kocev, P. Panov. "*A catalogue with semantic annotations makes multilabel datasets FAIR*". (2022). Nature Scientfic Reports 12, 7267. https://doi.org/10.1038/s41598-022-11316-3, (h5 index 210, IF 4.7).
4. T. Eftimov, G. Petelin, G. Cenikj, A. Kostovska, G. Ispirova, P. Korošec, **J. Bogatinovski**. "*Less is more: Selecting the right benchmarking set of data for time series classification*". (2022). Expert Systems with Applications, 198:116871, https://doi.org/10.1016/j.eswa.2022.116871, (h5 index 148, IF 8.5, Open Access).

Conference Proceedings:

1. **J. Bogatinovski,** O. Kao, Q. Yu and J. Cardoso. *"First CE Matters: On the Importance of Long Term Properties on Memory Failure Prediction"*. (2022). IEEE International Conference on Big Data (Big Data), Osaka, Japan, 2022, pp. 4733-4736, doi: 10.1109/BigData55660.2022.10020671 (h-index 53).
2. **J. Bogatinovski**, S. Nedelkoski, A. Acker, J. Cardoso, and O. Kao. "*QuLog: data-driven approach for log instruction quality assessment".* (2022). In Proceedings of the 30th IEEE/ACM International Conference on Program Comprehension (ICPC '22). Association for Computing Machinery, New York, NY, USA, 275–286. https://doi.org/10.1145/3524610.3527906 (h-index 31).
3. **J. Bogatinovski** and O. Kao, *"Auto-Logging: AI-centred Logging Instrumentation"*. (2023). IEEE/ACM 45th International Conference on Software Engineering: New Ideas and Emerging Results (ICSE-NIER), Melbourne, Australia, 2023, pp. 95-100, doi: 10.1109/ICSE-NIER58687.2023.00023 (h5 index 85).
4. **J. Bogatinovski**, S. Nedelkoski, A. Acker, J. Cardoso, O. Kao. (2021). "*Self-supervised Log Parsing"*. In: Machine Learning and Knowledge Discovery in Databases: Applied Data Science Track. ECML PKDD 2020. Lecture Notes in Computer Science, vol 12460. Springer, Cham. https://doi.org/10.1007/978-3-030-67667-4_8. (h5 index 42).
5. **J. Bogatinovski**, S. Nedelkoski, L. Wu, J. Cardoso and O. Kao, *"Failure Identification from Unstable Log Data using Deep Learning".* (2022). 22nd IEEE International Symposium on Cluster, Cloud and Internet Computing (CCGrid), Taormina, Italy, 2022, pp. 346-355, doi: 10.1109/CCGrid54584.2022.00044 (h-index 24, Open Access).
6. **J. Bogatinovski**, G. Madjarov, S. Nedelkoski, J. Cardoso and O. Kao. *"Leveraging Log Instructions in Log-based Anomaly Detection". (*2022). IEEE International Conference on Services Computing (SCC), Barcelona, Spain, 2022, pp. 321-326, doi: 10.1109/SCC55611.2022.00053 (h5-index 17, Open Access).
7. S. Nedelkoski, **J. Bogatinovski**, A. Acker, J. Cardoso and O. Kao, *"Self-Attentive Classification-Based Anomaly Detection in Unstructured Logs"*, (2020) IEEE International Conference on Data Mining (ICDM), Sorrento, Italy, 2020, pp. 1196-1201, doi: 10.1109/ICDM50108.2020.00148. (h5 index 52)

Service to the Scientific Community

- Organizing conference/workshop/tutorial: ECML-PKDD 17', AIOps 20/21/23, FAIR MLC 21'.
- Peer reviewing and program committee: IJCAI, ICDM, NeurIPS, JSS, ESWA, DMKD, BIBM.

Collaborators for Contact

- Prof. Dr. Kao Odej, Technical University Berlin, Distributed and Operating Systems, e-mail: *odej.kao@tu-berlin.de.*

- Dr. Jorge Cardoso, Huawei Munich Research, Leader of the Ultra-scale AIOps Lab, e-mail: *jorge.cardoso@huawei.com.*

- Prof. Dr. Gjorgji Madjarov, University of Ss Cyril and Methodius, Faculty of Computer Science and Information Technologies, Department for Computer Systems, CEO Elevate Global, e-mail: *gjorgji.madjarov@finki.ukim.mk.*

- Dr Dragi Kocev, Department of Knowledge Technologies, Institute Jožef Stefan, Ljubljana Slovenia, CEO Bias-Variance Labs, e-mail: *dragi.kocev@ijs.si.*

- Academic Prof. Dr. Sasho Dzeroski, Department of Knowledge Technologies, Institute Jožef Stefan, Ljubljana Slovenia, e-mail: *saso.dzeroski@ijs.si.*