

# Đorđe Miladinović

## Curriculum Vitæ

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### Machine Learning Engineer & Researcher | PhD in Computer Science

## Summary

I am a computer scientist with a machine learning-focused PhD. I have experience in taking projects from concept to working system.

## Education

- Sep'17-Jun'21 **ETH Zürich – PhD in Computer Science – Machine Learning.**
- Thesis: "On Training Deep Generative Models with Latent Variables" – Prof. Joachim Buhmann.
  - Research areas: Generative image and text modeling | variational autoencoders | representation learning | deep learning | computer vision | natural language processing | machine learning for biology.
  - I collaborated with the groups of Prof. Jürgen Schmidhuber, Prof. Bernhard Schölkopf and Prof. Steven A. Brown.
- Sep'13-Jun'16 **ETH Zürich – MS in Computer Science.**
- Thesis: "Perceptual Analysis Framework for Discovering Anomalies in Humanoid Arm Motions" – Prof. Otmar Hilliges.
  - Focus: Software engineering | operating systems | distributed computing | machine learning.
- Sep'09-Sep'13 **University of Belgrade, ETF – BS in Electrical Engineering & Computer Science.**
- Thesis: "Java-based Interactive Software Simulator of a CISC Processor" – Prof. Zaharije Radivojević.
  - Focus: Software engineering and design | algorithms | data structures | operating systems | hardware design.

## Work Experience

- Feb'17-Present **ETH Zürich, Institute for Machine Learning – Research Scientist.**
- [Python/PyTorch] I led a team of researchers to develop a web platform that uses convolutional neural networks to recognize sleep patterns from brain signals (<http://sleeplearning.ethz.ch>) – over 10'000 submissions worldwide.
  - [Python/PyTorch] I co-invented a new type of neural network for realistic image synthesis. I used it to develop a state-of-the-art variational autoencoder for image modeling ([github.com/djordjemila/sdn](https://github.com/djordjemila/sdn)).
  - Research, development and project management in interdisciplinary collaborations:
  - Zurich Exhalomics (<http://hochschulmedizin.uzh.ch/zurich-exhalomics>) – I led a team of students to develop a tool that automatically calibrates the mass spectrum of human breath, and also a machine-learning algorithm to detect causal relations between metabolites in the human body and sleep stages (relating metabolism to sleep).
  - Sleep Loop ([sleeploop.ch](http://sleeploop.ch)) – I co-developed an algorithm to recognize sleep stages from wireless device recordings.
  - VirtaMed collaboration (<http://www.virtamed.com>) – I developed a machine-learning algorithm with UI to evaluate the performance of trainee surgeons on a virtual surgery simulator (see the demo at <http://bit.ly/2PJqY2J>).
- Sep'18-Dec'18 **Max Planck Institute for Intelligent Systems – Research Scientist.**
- [Python/PyTorch] I applied principles of causal reasoning to (i) develop a neural network architecture to model dynamical systems, improving unsupervised transfer learning; (ii) validate representations of deep generative models.
- Sep'16-Feb'17 **Logitech Europe S.A. Data Science & Advanced Analytics – Software Engineer | ML Engineer.**
- [Python/SQL] I developed a machine-learning pipeline that (i) collects and processes user activity logs for a Logitech product from the database; (ii) uses processed data to identify user cohorts and perform targeted advertising.
  - Java/Python] I implemented a natural language processing pipeline that (i) scraps opinions from Amazon reviews on different Logitech products; (ii) automatically analyzes the sentiments from those reviews for different product aspects.
- Jan'16-Sep'16 **Disney Research Zürich, Vision and Sensing Research Group – Research Scientist | ML Engineer.**
- [Python/C++/Matlab/Blender/HTML/CSS] I designed a framework for detecting mechanical failures in Disney's humanoid robots based on IMU sensor readings. The framework is based on a machine-learning algorithm that provides the human-like judgment on robot degradation. To provide training data for the algorithm, I also designed a web survey in which the participants compared graphical renderings of proper and degraded human motions.

## Languages

Serbian (Native), English (Fluent), German (B1), Spanish (Beginner)

## Academic Activities

- Dec'19 I co-organized the "Disentanglement Challenge" at NeurIPS 2019 ([bit.ly/36bTD4W](http://bit.ly/36bTD4W)).
- 2017-2021 I review papers at NeurIPS, ICML and ICLR.
- 2017-2020 Taught "Advanced Machine Learning" and "Statistical Learning Theory" at ETH Zürich.
- 2017-2020 Supervised more than 10 MS students (<http://djordjemila.github.io/#teaching-mentoring>).

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## Selected Publications

- [1] **Dorđe Miladinović**, Aleksandar Stanić, Stefan Bauer, Jürgen Schmidhuber & Joachim M. Buhmann  
*Spatial Dependency Networks: Neural Layers for Improved Generative Image Modeling*  
International Conference on Learning Representations, **ICLR 2021**
  - [2] Raphael Suter, **Dorđe Miladinović**, Stefan Bauer & Bernhard Schölkopf  
*Robustly Disentangled Causal Mechanisms: Validating Deep Representations for Interventional Robustness*  
International Conference on Machine Learning, **ICML 2019**
  - [3] **Dorđe Miladinović**, Muhammad Waleed Gondal, Bernhard Schölkopf, Joachim M. Buhmann & Stefan Bauer  
*Disentangled state space representations*  
DeepGen workshop, International Conference on Representation Learning, **ICLR 2019**
  - [4] **Dorđe Miladinović** et al.  
*SPINDLE: End-to-end Learning from EEG/EMG to Extrapolate Animal Sleep Scoring Across Experimental Settings, Labs and Species*, **PloS Computational Biology 2019**
- See the complete list at <http://djordjemila.github.io/#publications>

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## Computer Skills

4 years of coding in	Python   PyTorch   C/C++   Java   Bash   L <sup>A</sup> T <sub>E</sub> X
2 years of coding in	Matlab   SQL   HTML   CSS
1 year of coding in	Tensorflow   Torch   Node.js   Blender   C#   Jekyll   Javascript   VHDL
Frameworks used	Unix   Git   SVN   CUDA   PyTorchLightning   Fairseq   NLTK   OpenCV   Pandas   Scikit-learn   SciPy   NumPy   Scrappy   Django   Celery   ROS   UML   Amazon AWS   Hadoop MapReduce   MongoDB   PostgreSQL

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## Older Notable Projects

Machine learning	[Matlab] I designed a Netflix-like recommender system based on state-of-the-art collaborative filtering methods.
Distributed systems	[C++/Node.js] I co-developed a framework for fail-safe landing of micro-aerial vehicles, protected against Denial of Service (DoS) attacks. [Java/Python] I designed a 3-tier messaging system (client-middleware-database) and its theoretical model.
Operating systems	[C] I worked on the design and optimization of a research operating system ( <a href="http://www.barrelfish.org">http://www.barrelfish.org</a> ). [C++/Assembly] I implemented a multi-threaded kernel with time sharing. [C++] I implemented a simplified file system designed for partitions on a standard hard drive. [Java] I implemented a compiler for a simplified version of the Java language.
Hardware-related	[Java] I designed an interactive visual simulator of a CISC processor. [VHDL] I implemented a 32-bit ARM processor with all relevant components (pipeline/branch prediction/cache).

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## Hobbies

Waterpolo | Swimming | Skiing and snowboarding | Tennis | Cinematography | Reading