Dr. Dmitrij **Sitenko**

Research Data Scientist

"Passion for applying mathematics to data serves as the compass, guiding us toward genius insights and creative solutions."

Curriculum Vitae

Experience

06/23−Now

Postdoctoral Researcher

Structures Cluster of Excellence, Heidelberg

I am currently working on an exploratory project titled

"Physics-Informed Machine Learning for Quantum State Tomography."

This research aims to bridge the gap between tensor parametrization, graphical models, and deep machine learning. My focus includes:

- Integrating Graphical Models with Deep Neural Networks (DNNs) to enhance their joint expressivity (PyTorch, C/C++).
- Simulating Quantum States in high dimensions using deep generative models and tensor networks.
- Engaging in interdisciplinary collaboration with physical scientists in a team environment.

01/21-06/23

PhD Research Assistant

Image & and Pattern Analysis Group

My research focused on development of accelerated algorithms for nonconvex optimization problems and for Supervised Data Labeling (Label Learning) using nonlocal PDEs on Graphs:

- Modeling of Machine Learning and Computer Vision approaches
- Conference presentations and publication of research results

12/18-12/20

PhD Research Assistant

Heidelberg Collaboratory for Image Processing
& Heidelberg Engineering

Medical-applications driven project to develop scalable algorithms for *simultaneous* vessel tracking and layer detection on volumetric pathological OCT/OCTA data:

- Elaboration of C-accelerated CPU and GPU 3D-data preprocessing tasks (Cython,CUDA) and their integration into customer ready software.
- Implementation of end-to-end computational pipeline integrating data denoising, visualization, and segmentation for accurate pathology detection.
- Collaboration with team partners by presenting weekly status updates (JIRA,GIT) to ensure joint project requirements.

02/13-08/18

Lecture Assistant

Karlsruhe Institute of Tenchnology (KIT)

Administration and organization of lectures, seminars and software practicals on Computer Vision, Machine Learning Graphical Models and Deep Learning as well as co-supervision of master theses.

02/17-08/18

Undergraduate Research Assistant, Karlsruhe

FZI Research Center for Information Technology

Participation in the medical-application driven ROBINA project, developing a ROS-based program to control a robotic arm using intertidal sensors for human detection and motion tracking:

- Design and mathematical support in implementing real life application, integrating robotic guidance with speech recognition, image processing, and strategy optimization through machine learning.
- Analyzing camera and motion sensor data and subsequent integration into customer software pipeline.
- Extension of maintenance software.

Portfolio

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dmitrij.sitenko@iwr.uni-heidelberg.de
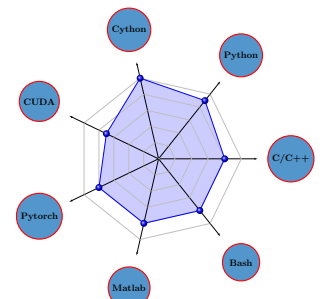
Date of Birth
06.05.1991 in
Rubzowsk (Russia)

Nationality
German

Marital Status
Married

Language Skills

German ★★★★★
Russian ★★★★★
English ★★★★★
Spain ★★★★☆
Arabic ★★

Programming Skills

Tools & OS

Linux ★★★★★
Windows ★★★★

VS Code ★★★★★
Spyder ★★★★

Git ★★★★
LATEX ★★★★★
MS Office ★★★

ParaView ★★★★
Mayavi ★★★★
Gimp ★★★★

09/09,09/11 **Web-Developer, Waldorf**

System Applications and Products in Data Processing (SAP)

Data Management and Software Development with Javascipt and SQL:
- Agile software and IT architecture design in a team.
- Contribution to a class library for database connection management.

Education

12/18-06/23 **Doctor of Science in Mathematics (Dr. rer. nat.)**

Ruprecht Karl University of Heidelberg

PhD thesis: Nonlocal Graph-PDEs and Riemannian Gradient Flows for Image Labeling

Specialization: Dynamical formulation of Machine Learning models for Medical Imaging problems on graphs

Relevant methods: Variational Models, Convex and Nonconvex Optimization, Geometric Methods (Riemannian Manifolds), Deep Learning, Nonlocal PDEs.

Overall grade: 1.0 (Magma Cum Laude)

09/14-08/18 **Master Degree (Master of Science)**

Karlsruher Institute of Technology

Master thesis: Time Domain Boundary Integral Equations and Application of the Convolution Quadrature

Specialization: Weak formulations of acoustic transmission problems using causal tempered distributions and their numerical solution using discretization of the Laplace domain.

Relevant methods: PDEs, Finite Elements, Inverse Problems.

Overall grade: 1.8

08/16-02/17 **Exchange Semester (Scientific Computing)**

National Taiwan University (NTU)

Specialization: Computational Physics for modeling entangled quantum systems via implementation of Monte Carlo Simulations (C/C++).

09/11-09/14 **Bachelor Degree**

Karlsruhe Institute of Tenchnology
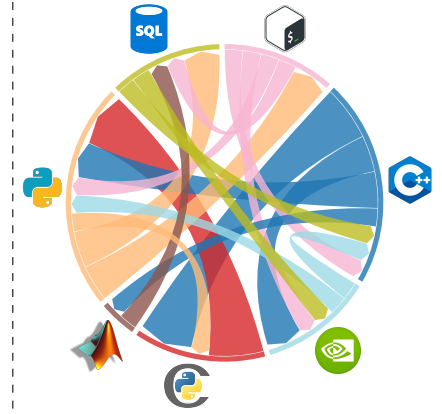
Bachelor theses Geometric Rigidity
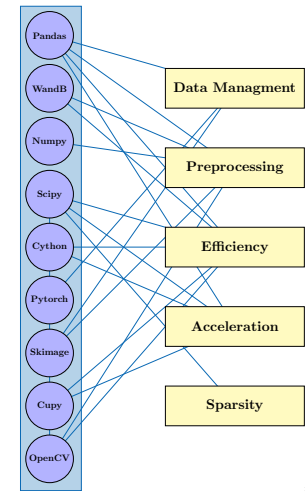
Overall grade: 2.3

09/08-09/11 **Academic high school of economy (Fachhochschulreife)**

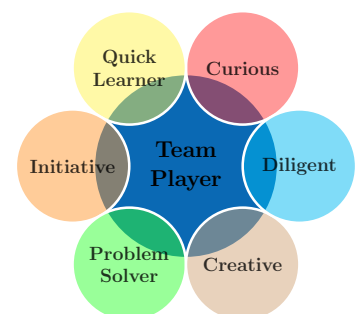Friedrich List Wirtschaftsgymnasium

Personal Workflow

Python

Generative Modeling

Flow-Matching	★★★★★
Score Matching (Diffusion)	★★★★☆
Neural ODEs	★★★★☆
Energy-Based-Models	★★★★★
Transformers	★★★★☆
Encoder-Decoder	★★★★☆
GANs	★★★☆☆
RNNs	★★★☆☆

Feature Extraction

CNNs	★★★★★
U-net/Res-Net	★★★★★

Personal Skills

Publications (Selection)

A Nonlocal Graph-PDE and Higher-Order Geometric Integration for Image Labeling

D. Sitenko, B. Boll and , C. Schnörr, SIAM J. Imaging Sciences, 16 (1): 501-567, 2023.

Assignment Flow For Order-Constrained OCT Segmentation

D. Sitenko, B. Boll and , C. Schnörr. In Int. J., Computer Vision, 129: 3088-3118, 2021

Assignment Flows and Nonlocal PDEs on Graphs

D. Sitenko, B. Boll and , C. Schnörr. In DAGM GCPR, Springer, LNCS , 2021.

Assignment Flow for Order-Constrained OCT Segmentation

D. Sitenko, B. Boll and , C. Schnörr. In DAGM GCPR, Springer, LNCS, 2020

Invited Talks

Assignment Flows and Nonlocal PDEs on Graphs

In DAGM Germany Conference of Pattern Recognition, 2021

Assignment Flow for Order-Constrained OCT Segmentation

In DAGM Germany Conference of Pattern Recognition, 2020

Preserving the Geometric Order of Retina Segmentation with Assignment Flow

In Heidelberg Collaboratory of Image Processing 2019

Personal Projects

- Preprocessing Pipeline for Representation, Regularization and Enhancement of volumetric tubular data OCTA, MRI. (Cython,Python,CUDA,Jupiter)

- Local Feature Extraction Pipeline with Geometric Riemannian and Deep Learning Methods.(Cython,Python,CUDA,Jupiter,Pytorch)

- Fast Marching Algorithm for Solving Eikonal Equations for Vessel Tracking, Dataset Visualization and Image Labeling on Graphs. (Cython,Python,CUDA,Pytorch)

- Order Constrained Retinal Layer Detection on volumetric OCT data.

- Quantum State Tomography using 2D Tensor Networks and Hypergraphs

- Implementation of Template-Based Tree Data Strucutures for data processing and sorting. (C/C++)

Heidelberg, *29 December 2024*

Dr. Dmitrij Sitenko

All Publications

Semantic **Scholar**

Interests