

# Pakshal Bohra

## Summary

Machine learning (ML) researcher and engineer with 7+ years of experience developing ML systems. I bring a strong theoretical foundation in ML and signal processing, along with solid software engineering skills, and I work across the full ML development cycle from research to deployment.

## Experience

- Aug 2024 **Computational Software Engineer**, Distran AG, Zurich, Switzerland  
– Present
- Fine-tuning foundation models on proprietary data and deploying them on edge devices for advanced real-time acoustic scene understanding
  - Designed and implemented end-to-end ML workflows for developing trustworthy models for quantitative acoustic-image analysis
  - Built production-grade internal tools, including a semantic search engine based on multimodal foundation models
  - Developed and contributed high-performance ultrasonic imaging pipelines to the company's JAX-based scientific computing toolkit
  - Acting as Scrum Master for the team, facilitating sprint planning and review meetings, backlog refinement, workload estimation, and progress tracking
- Sep 2018 **Research Assistant**, Biomedical Imaging Group, EPFL, Lausanne, Switzerland  
– June 2024
- Focus: Machine Learning, Statistics, Computational Imaging
- Developed state-of-the-art image and video reconstruction pipelines based on deep generative models for quantitative phase imaging
  - Designed and implemented a novel learnable activation function for building robust and stable deep neural networks
  - Introduced an ultra-fast and interpretable deep-learning-based image-reconstruction algorithm and applied it to MRI and CT imaging
  - Supervised 13 student projects (master's theses, internships, and semester projects)
  - Published 11 papers (7 as first author), and presented tutorials at the SIAM Conference on Imaging Science and the IEEE International Symposium on Biomedical Imaging
- June 2017 **Graduate Student Researcher**, IIT Bombay, Mumbai, India  
– June 2018
- Focus: Signal Processing, Optimization, Statistics, Communication Systems
- Master's Thesis: *Poisson Inverse Problems with Performance Bounds*
- Developed sparsity-driven estimators based on variance-stabilizing transforms for recovering signals and images under Poisson or Poisson-Gaussian noise
  - Published 2 first-author papers based on this work
- R&D Semester Project: *Cooperative Viewing in Immersive Videos* (Fall 2017)
- Proposed a system where multiple users are viewing an immersive video and the server detects popular events via user-generated auxiliary data and informs them about those events
  - Built an Android application with a 360-degree video player, two-way server communication, and a server-side data-analysis routine for event detection

- May 2016 **Research Intern**, Siemens Healthineers, Bengaluru, India  
– July 2016 Focus: Computer Vision, Image Segmentation, Machine Learning
- Developed an algorithm based on supervoxel features, random forest classifiers and the graph cuts method for the automated segmentation of the spleen in CT images

## Education

- Sep 2018 **PhD in Electrical Engineering**, École Polytechnique Fédérale de Lausanne (EPFL)  
– June 2024 Research areas: Machine Learning, Deep Learning, Statistics, Computational Imaging  
Thesis Advisor: Prof. Michael Unser
- July 2013 **B.Tech + M.Tech in Electrical Engineering**, Indian Institute of Technology (IIT) Bombay  
– June 2018 Minor in Computer Science and Engineering  
Major GPA: 9.55/10 (ranking: top 10%)

## Technical Skills

- Languages Python, MATLAB, Java, C++
- Frameworks and Libraries
- Machine Learning: PyTorch, JAX, Equinox, scikit-learn, XGBoost, Transformers (Hugging Face), SentenceTransformers, OpenCLIP
  - Computer Vision and Image Processing: OpenCV, scikit-image, FFmpeg, ImageJ
  - Data Processing and Analysis: NumPy, SciPy, pandas, polars, SQLite
  - Data Visualization and UI: matplotlib, seaborn, plotly, Streamlit
- Dev/ML Ops Git, Docker, Jenkins, Data Version Control (DVC)
- Others Linux,  $\text{\LaTeX}$ , Android Studio, Unity 3D

## Selected Publications (\* denotes equal contribution)

- **P. Bohra**<sup>\*</sup>, J. Campos<sup>\*</sup>, H. Gupta, S. Aziznejad, and M. Unser, “[Learning Activation Functions in Deep \(Spline\) Neural Networks](#)”, *IEEE Open Journal of Signal Processing*, 2020
- **P. Bohra**, T. -a. Pham, J. Dong, and M. Unser, “[Bayesian Inversion for Nonlinear Imaging Models Using Deep Generative Priors](#)”, *IEEE Transactions on Computational Imaging*, 2022
- **P. Bohra**<sup>\*</sup>, T. -a. Pham<sup>\*</sup>, Y. Long, J. Yoo, and M. Unser, “[Dynamic Fourier Ptychography With Deep Spatiotemporal Priors](#)”, *Inverse Problems*, 2023
- S. Ducotterd, A. Goujon, **P. Bohra**, D. Perdios, S. Neumayer, and M. Unser, “[Improving Lipschitz-Constrained Neural Networks by Learning Activation Functions](#)”, *Journal of Machine Learning Research*, 2024
- A. Goujon, S. Neumayer, **P. Bohra**, S. Ducotterd, and M. Unser, “[A Neural-Network-Based Convex Regularizer for Inverse Problems](#)”, *IEEE Transactions on Computational Imaging*, 2023
- **P. Bohra**, P. del Aguila Pla, J. -F. Giovannelli, and M. Unser, “[A Statistical Framework To Investigate the Optimality of Signal-Reconstruction Methods](#)”, *IEEE Transactions on Signal Processing*, 2023

## Teaching and Mentoring

- Sep 2018 **Teaching Assistant**, EPFL  
– June 2022
- TA for Image Processing I (~200 students) and Image Processing II (~60 students)
  - Responsible for conducting weekly exercise sessions and organizing and grading exams
  - Served as Head TA for Image Processing I in Fall 2021, managing a team of 14 TAs
- July 2016 **Student Mentor**, IIT Bombay  
– June 2018
- Selected twice for the 80-member senior mentor team supporting incoming freshmen