Dennis MADSEN, PH.D.

github | linkedin
personal | youtube

SUMMARY

I am a dedicated Machine Learning Engineer who can take projects from raw data to full operation and continuous monitoring. I have a Ph.D. and an M.Sc. in Computer Science and Mathematics, specializing in computer vision and computer graphics, and a B.Sc. in Electrical Engineering.

My focus is on real-world machine-learning applications that add value. I am keen on classical computer vision and machine learning methods, probabilistic methods, and generative models.

I am a continuous learner who likes new challenges and acquiring new skills, e.g., through lecturing, pitch competitions, coding hackathons, and video creation.

SKILLS

GENERAL	Artificial Intelligence (AI) | Machine Learning (ML) | Computer Vision (CV) | Statistical Shape Models | Generative Models | Entrepreneurship | Prototyping | Research & Development | Medical Computer Vision | Probability and Statistics | Software Engineering | Video Editing | Public Speaking | Lecturing | Linux
PROGRAMMING LANGUAGES	***Experienced:*** Python | Scala | Javascript ***Knowledgeable:*** C | Bash | Java | VHDL | SQL
FRAMEWORKS & LIBRARIES	PyTorch | PyTorch Lightning | Jupyter | Matplotplib | Numpy | Pandas | Scikit-learn | Monai | VTK | ITK | Nibabel | Scipy | Pytest | Tensorflow | Threejs | React | Scalismo
SOFTWARE DEVELOPMENT	Programming Paradigms | GIT | CLI | Docker | DVC | Debugging | Agile Methodology | MlOps Life-cycles | CI/CD | Open-source
LANGUAGES	***Native:*** Danish ***Fluent:*** English ***Advanced:*** German

EXPERIENCE

University of Zürich (Zürich, Switzerland) — *03.2023 - 04.2024*

Postdoctoral Researcher - *Bridge Proof-of-Concept fellow.*

- Computer vision research on CBCT and IOS images for dental applications.

Dentexion GmbH (Zug, Switzerland) — *01.2022 - 05.2024*

Founder - *Building an AI powered cloud-platform for dentists.*

- Developing a fully automatic SaaS platform to upload and analyze dental images (cloud-based) for preventive care.
- On the technical side I was responsible for all ML aspects and computer graphics (Threejs).

University of Basel (Basel, Switzerland) — *08.2021 - 02.2023*

Postdoctoral Researcher

University of Basel (Basel, Switzerland) — *09.2017 - 07.2021*

Research Assistant / Ph.D. Candidate / Lecturer

- Research in the area of medical computer vision using statistical shape models.
- Lecturing the Pattern Recognition course for bachelor students on probability theory and deep learning.

Capana (Denmark, remote from Switzerland) — *07.2016 - 12.2019*

Consultant

- Developing internal productivity tools for Seimens Wind Power in Python and Web2Py.
- Full application lifecycle, from identifying needs, planning to development and production.

Siemens Wind Power (Brande, Denmark) — *04.2014 - 08.2015*

Embedded Software Support Engineer

- Work task automation of manual procedures; software updates and support of Siemens Wind Turbine Controllers.

Litepoint (Sunnyvale, California, USA) — *04.2013 - 09.2013*

Electronic Engineer Intern

- Creating a test system interface to check cell-phone cellular data signal using a local Django application.

Microdevelopment (Herning, Denmark) *11.2009 - 09.2014*

***Founder** - Producing electronic speed tables for use in historical reliability races.*

- Software development in C for a PIC microcontroller, web development with payment system and customer contact.

KK-Electronic (Ikast, Denmark) *01.2006 - 03.2014*

Electronic Industrial Technician Trainee / Embedded Software Engineer Student

- HW design, embedded SW (C/assembler), documentation, prototyping (mechanic, PCB, test scripting), HW coding (VHDL).

Education

University of Basel (Basel, Switzerland) *2017 - 2021*

***Ph.D. Computer Science & Mathematics** (Summa cum laude)*

- Thesis: A Probabilistic Surface Registration Framework with Applications to Partial Data Analysis.
- Model-based medical image analysis focused on registration and modelling using partial data and reconstruction uncertainty.

University of Basel (Basel, Switzerland) *2015 - 2017*

***M.Sc. Computer Science & Mathematics** (6.0 / A)*

- Thesis: Craniofacial modelling by combining statistical models of the face and the skull - Combining independent shape models.

Aarhus University (Herning, Denmark) *2010 - 2014*

***B.Sc. Electronic Design Engineer** (12.0 / A)*

- Thesis: Power quality analysis of wind turbines - Harmonic frequency analysis prototype implementation in a TI DSP.

Aarhus University (Herning, Denmark) *2009 - 2010*

University pre-admission course

Mercantec (Viborg, Denmark) *2005 - 2009*

Electronic Industrial Technician

Certifications

- Innosuisse Business Creation MEDTECH, Switzerland - 2023
- Innosuisse Start-up Training: Business Concept (Module 2), Switzerland - 2021
- Project Management - A Toolbox for Scientists, Switzerland - 2021

Awards & Hackaton Participation

- Medical Imaging Summer School (Favignana, Italy) – Best Presentation Award - 2018
- EXCITE Summer school (Zürich, Switzerland) – 2nd Best Presentation Award – 2018
- CopenHacks (Copenhagen, Denmark) – Price winner - 2017
- LauzHack (Lausanne, Switzerland) – Winner of the main sponsor (Logitech) challenge – 2016
- HackZürich (Zürich, Switzerland) – Europe's largest hackaton Participant – 2016, 2017, 2018

Open-source Software Maintainer

Scalismo	Scala library for statistical shape modeling
Scalismo-UI	Scala library for visualization of statistical shape models
GiNGR	Scala library for non-rigid registration (based on my PhD Thesis)

Publications

Books

A Probabilistic Surface Registration Framework with Applications to Partial Data Analysis

Dennis Madsen

University of Basel, 2021

International peer-reviewed conferences/proceedings

Sequential gaussian process regression for simultaneous pathology detection and shape reconstruction

Dana Rahbani, Andreas Morel-Forster, Dennis Madsen, Jonathan Aellen, Thomas Vetter

International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), 2021

A closest point proposal for MCMC-based probabilistic surface registration

Dennis Madsen, Andreas Morel-Forster, Patrick Kahr, Dana Rahbani, Thomas Vetter, Marcel Lüthi

European Conference on Computer Vision (ECCV), 2020

Probabilistic joint face-skull modelling for facial reconstruction

Dennis Madsen, Marcel Lüthi, Andreas Schneider, Thomas Vetter

Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2018

International peer-reviewed workshops/proceedings

Learning Shape Priors from Pieces

Dennis Madsen, Jonathan Aellen, Andreas Morel-Forster, Thomas Vetter, Marcel Lüthi

International Workshop on Shape in Medical Imaging (ShapeMi), 2020

Probabilistic surface reconstruction with unknown correspondence

Dennis Madsen, Thomas Vetter, Marcel Lüthi

Uncertainty for Safe Utilization of Machine Learning in Medical Imaging and Clinical Image-Based Procedures (UNSURE), 2019

Robust registration of statistical shape models for unsupervised pathology annotation

Dana Rahbani, Andreas Morel-Forster, Dennis Madsen, Marcel Lüthi, Thomas Vetter

Large-Scale Annotation of Biomedical Data and Expert Label Synthesis and Hardware Aware Learning for Medical Imaging and Computer Assisted Intervention (LABELS), 2019

Other

GiNGR: Generalized Iterative Non-Rigid Point Cloud and Surface Registration Using Gaussian Process Regression

Dennis Madsen, Jonathan Aellen, Andreas Morel-Forster, Thomas Vetter, Marcel Lüthi

arXiv preprint arXiv:2203.09986 *(2022). 2022*