Dr. HEUNA KIM

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WORKING EXPERIENCE

2021–02 ∼ 2021–07 **Senior Machine Learning Engineer**
Pupil Labs GmbH (Deep Learning powered head-mounted eye tracker)

Gaze Direction and Point Estimation
- developed a deep learning model capable of incorporating individual eye geometry and camera geometry in PyTorch, PyTorch Geometric and OpenCV

2020–06 ∼ 2020–12 **Researcher (Initiated the Project)**
Project Vibranium (Power trading optimization)

Trading Behavior and Portfolio Optimization for Electricity Markets
- conducted the time-series-based market analysis for different electricity markets
- researched power trading optimization by adapting model-free reinforcement learning

2018–01 ∼ 2020–05 **Senior Deep Learning Researcher**
Haezoom Europe GmbH (IT-based service platform for solar power forecasting)

Short-term Solar Power Forecasting based on Satellite "Chollian 2" data
- as a **team lead**, supervised and collaborated with the algorithm research team of 5 people to develop (1) clear sky image compositions, (2) cloud motion tracking using optical flow, (3) microdust and snow detection algorithms
- designed an architecture of a satellite image processing pipeline for a newly launched satellite "Chollian 2" and implemented/delivered it as an API service

Wind Power Forecasting
- **Award**: won 4th place for the wind power forecasting competition 2019 by Korea Power Exchange (KPX)
- implemented forecasting models based on numerical weather prediction (NWP) data
- achieved high-accuracy forecasting based on a hybrid (statistical-physical) model by applying bias corrections, ensemble, and power curve fitting with a variational method

3D Building Reconstruction Prototype using Satellite Images for Shadow Simulation
- extracted the depth from 2D Satellite images by applying GAN-based (Generative Adversarial Network) super resolution, deblurring, stereo vision and depth estimation
- used SNAP (Sentinel Application Platform API) for satellite "Sentinel 2" and Boto3 (AWS S3) for satellite "Landsat 8", QGIS and ImageMagick for raster images

Cloud Detection and Cloud Motion Estimation
- developed cloud detection and cloud motion estimation by using optical flow and transmittance simulators (RTTOV, 6S) based on satellite "Himawari 8" data

2016–12 ∼ 2017–11 **Deep Learning Researcher**
Twenty Billion Neurons GmbH (Deep Learning based video analysis software)

Realtime Common Sense Recognition for Video
- **published** at ICCV 2017
- developed an online RNN (Recurrent Neural Network) model combined with 3D-CNN (Convolutional Neural Network) that understands temporal common sense
- improved the accuracy from 5% to 85% and implemented the model in Tensorflow

A Cross-Team Collaboration for Video Captioning and Temporal Action Localization

Realtime Video Analysis Demo Infrastructure in Python
- implemented a demo that supports OpenCV video streaming, network communication (ZMQ) and multiprocessing on Raspberry Pi and Jetson board

EDUCATION

2013–06 ∼ 2016–06 **Ph.D. Mathematics and Computer Science** (Magna Cum Laude)
Freie Universität Berlin (FU Berlin), Germany

- Scholarship from German Research Foundation: Methods for Discrete Structures
- See the webpage for **publications** including **7 reviewed** and **3 weakly reviewed** papers.

2011–02 ∼ 2013–02 **M.S. Computer Science** (GPA: 4.25/4.30, 99.44%)
Korea Advanced Institute of Science and Technology (KAIST), South Korea

Awards
- Best Poster Award for Master Thesis
- National Research Scholarship from Korea Scholarship Fund

2004–03 ∼ 2008–02 **B.S. Mathematics, Minor in Physics** (GPA: 3.57/4.30, 92.7%)
Pohang University of Science and Technology (POSTECH), South Korea

Awards
- Honorable Scholarship from the President of Korea
- Honorable Scholarship from Korea Foundation for Advanced Studies
- Silver Medal from National Collegiate Programming Competition
- Winner of Software Security Team Competition between POSTECH & KAIST

SKILLS

Programming	Proficient: Python, LaTeX, SQL (PostgreSQL, MySQL, SQLite, and DB theory) Intermediate: Java, Haskell, R, Bash/Zsh Small Projects: C++03, Standard ML, Coq, Sage, Maple, MATLAB, Octave
Frameworks	Tensorflow, PyTorch, OpenCV, Hadoop
Data/Numerical	scikit-learn, NumPy, SciPy, Matplotlib, pandas, seaborn
Methodologies	TDD, CI/CD (Travis CI, Jenkins, Docker), Agile (Scrum, Kanban, also as a moderator)
Environments	Proficient: Linux, Git
Language	English (IBT 105/120, Nov. 2012), German (C1), Korean (Native)

VOLUNTEERING AND TECHNICAL ACTIVITIES

2020–08 ∼ present	WiFi installation technician for refugee housing in Berlin (Freifunk Berlin)
2020–06 ∼ present	External advisor for a master student
Topic:	Optimizing loss model in power forecasting for Building Integrated Photovoltaics (BIPV)
2020–07 ∼ present	Collaborator of a sustainable food supply project
Topic:	Rice paddy area prediction in Sri Lanka based on a satellite “Sentinel 1” SAR data
2019–07 ∼ 2020–07	Teacher at ReDi School (non-profit organization for refugees and more)
Course:	Python for Data Analysis
2018–08 ∼ 2019–11	Master thesis supervisor (external commitee member, non-volunteering)
Topic:	Irradiance forecasting using satellite “Himawari 8” under snow conditions
2014–07 ∼ 2014–08	Organizer of a research visiting program for master students
Example Topic:	Enumerating combinatorially different convex hulls of points in lines
2014–08 ∼ 2014–08	Teacher at FU Berlin
Course:	Sommeruniversität: Experiencing theoretical computer science with Origami

OPEN SOURCE PROJECTS

2020–11	Haskell	lanyon-hakyll: a port of Lanyon theme for the Haskell-based static generator Hakyll
2020–11	Bash	ConfigAutomationMikrotik: automatic batch configuration scripts for Mikrotik routers
2019–06	Python	django-migration-vis: Django management command for visualizing migration graphs
2017–07	Python	GulpIO: binary storage format for deep learning on videos