Aknur Karabay

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aknur-karabay

EXPERIENCE

Research Internship — **Swiss Data Science Center, Zurich** — **June 2023 - Sept 2023**

Machine-Learning-assisted Ptychographic nanotomography

- Data pre-processing and transfer learning using GAN-based and deep image prior models for image-to-image translation and reconstuction of sparse chip (integrated circuits) image projections to identify manufacturing defects.
- Tech stack: Python, Docker, Git, Pytorch, OpenCV, Tomopy, Numpy, Scipy, Scikit-image, Matplotlib

Data Scientist — **Institute of Smart Systems and Artificial Intelligence, Astana** — **April 2021 - present**

Food Classification for Nutritional Dietary Interventions and digital food logging

- Scraped image and video data from search engines using Selenium and Beautiful Soup libraries to create a classification dataset for Central Asian Food of **16,499** images with **42 food classes**
- Performed data annotation, data cleaning and pre-processing for extracting food items from the scenes and removing low-resolution images
- Conducted parametric experiments using CNN models, achieved **Top-1 98.59%** using ResNet152 for 42 classes, and **Top-1 accuracy 98.01%** on the combined food datasets of 1,042 classes using EfficientNet-b7

Deep Learning for the automatic optimal designs of the reinforced concrete columns based on embodied carbon

- Generated a dataset of 195 million parametric column designs using Python and Openseespy library
- Wrote model training pipeline using a fully connected neural network on Pytorch
- Experimented with model architecture and hyperparameters to achieve **300 times** outperformance in terms of time **(1.2 sec vs 6 min)** and an average reduction of design embodied carbon by **23%** compared to human experts with a spreadsheet

Researcher — **Oct 2019 - April 2021**

- Extracted synthetic street images from the Cities game and performed domain transfer learning for car and pedestrian detection to improve the model performance for a small amount of real data in Astana streets. Achieved **mAP.5 of 0.915** for **5000** synthetic and **500** real images using YOLOv5 model
- Designed and programmed vaccination, vaccination hesitancy, contact tracing, and testing modules for the particle-based epidemic simulator in Matlab. Developed model parameters for network-based stochastic simulator.
- Constructed a 3D BIM model using Revit and Unity for Augmented Reality digital twin of the University campus building for fast emergency response and maintenance

Tech stack: Python, Docker, Pytorch, Pandas, Numpy, Beautiful Soup, Selenium, Matplotlib, OpenCV, Matlab

Reserach Internship — **KAIST, Daejeon, South Korea** — **June 2017 - August 2017**

Civil and Environmental Engineering Department

- Designed and constructed parametric pile foundations using Finite Element Modeling to study soil-structure interaction under dynamic lateral loading for energy storage foundations. **DOI 10.1088/1757-899X/271/1/012023**

EDUCATION

Glasgow, United Kingdom — **University of Glasgow** — **Sept 2018 – Sept 2019**

- MSc Structural Engineering, **with Merit**
- Thesis: Flexoelectric material modeling. [Matlab, Python, Linux]

Astana, Kazakhstan — **Nazarbayev University** — **Sept 2013 – May 2018**

- BEng in Civil Engineering, **top 10% of class**
- Senior Project: Structural Design of 20-story Reinforced Concrete office building in San-Francisco.

EXTRACURRICULAR ACTIVITIES AND AWARDS

- **Winner** of Yessenov Foundation Research Scholarship - **9 winners out 200 applications** (2023)
- Created educational videos on Basics of Machine Learning and Data Science (2020-2022)
- **1st place** in the Scientific poster competition of the 8th International Summit on Medical and Public Health Nutrition Education and Research (Cambridge, UK) (2022)
- **Finalist** of TechWomen program by IIE and US Department of States - **105 participants selected out of 3,100 applications from 22 countries** (2022). Hosted for the professional mentorship by Intel, Santa Clara, California, US
- **Finalist** in McKinsey Next Generation Women Leaders Award - **27 winners out of 810 applciations** (2020)
- **President** of Student Countil at School of Engineering, Nazarbayev University (January 2017 - May 2018)