KAAN OKUMUŞ

1007, Avenue Des Bains 9, Lausanne Switzerland
+41 78 230 85 79
kaan.okumus@epfl.ch

EDUCATION

Master of Science, École Polytechnique Fédérale de Lausanne (EPFL) Sep. 2021 - Present
Communication Systems
CGPA: 5.37/6.00, Anticipated Graduation Date: Jul. 2023

Bachelor of Science, Middle East Technical University (METU) Sep. 2016 - Jul. 2021
Electrical and Electronics Engineering
CGPA: 3.87/4.00, Ranked 6th out of 350 students

EXPERIENCE

Student Assistant Apr. 2022 - Sep. 2022
EPFL Hub for Advanced Image Reconstruction

I contributed to the development of PycSou v2. PycSou is a Python 3 package for solving linear inverse problems with state-of-art proximal algorithms. The software implements in a highly modular way the main building blocks -cost functionals, penalty terms and linear operators- of generic penalised convex optimisation problems. Source: `https://github.com/matthieumeo/pycsou/tree/v2-dev`

Intern Jul. 2022 - Sep. 2022
Kandou Bus

Charge-pump PLL (CP-PLL) is implemented for wired communication. Differential evolution and genetic algorithms are analyzed and implemented for the optimization of PLL performance parameters. A graphical user interface is designed to provide a complete application that wraps everything implemented with a visually appealing interface.

Intern Aug. 2020 - Sep. 2020
HAVELSAN A.Ş., Information and Communication Technologies

I designed and developed a cat breed detection app using Object Detection and Image Classification tools with Neural Networks and Deep Learning techniques. I also designed a GUI in Python for my application.

Intern Jun. 2020 - Aug. 2020
ASELSAN A.Ş., SST - Digital and Embedded Systems

Using MicroZed 7010 that is based on the Zynq-7000 family, I designed Embedded Hardware Systems using Vivado® Design Suite and developed them using its Software Development Kit (SDK) with the use of C programming language. Also, I designed Digital IIR and FIR filters using Python with Scipy module and run it on the operating system on MicroZed that is compiled using Petalinux.

PUBLICATIONS

PoGaIN: Poisson-Gaussian Image Noise Modeling from Paired Samples Nov. 2022
Nicolas Bähler, Majed El Helou, Étienne Objois, Kaan Okumuş, Sabine Süsstrunk

Image noise can often be accurately fitted to a Poisson-Gaussian distribution. However, estimating the distribution parameters from only a noisy image is a challenging task. Here, we study the case

when paired noisy and noise-free samples are available. No method is currently available to exploit the noise-free information, which holds the promise of achieving more accurate estimates. To fill this gap, we derive a novel, cumulant-based, approach for Poisson-Gaussian noise modeling from paired image samples. We show its improved performance over different baselines with special emphasis on MSE, effect of outliers, image dependence and bias, and additionally derive the log-likelihood function for further insight and discuss real-world applicability. Source: `https://arxiv.org/abs/2210.04866`

DiffuserCam Project Report Dec. 2021
Mehmet Onurcan Kaya, Kaan Okumuş, Eelis Mielonen, Adrian Jarret

Lensless imaging is performed using a piece of tape as the encoding element of a digital camera. The drawback of removing the lens is that the measured images are highly corrupted. Reconstruction of clean images are addressed by formulating inverse problems to solve for ground truth images. State-of-the-art methods are implemented by various cost functionals and optimisation algorithms, leveraging the flexibility of the python library, called Pycsou. Source: `https://infoscience.epfl.ch/record/291501?ln=en`

COMPUTER SKILLS

C, C++, MATLAB, Simulink, Java, Scala	*Advanced Level, Self-Improved*
Python with Numpy, Scipy, TensorFlow, PyTorch	*Advanced Level, Self-Improved*
Swift, SwiftUI, R, Linux, Bash	*Advanced Level, Self-Improved*
HTML, CSS, Javascript, MySQL	*Advanced Level, Self-Improved*

LANGUAGE PROFICIENCY

Turkish (*Native Speaker*), English (*Advanced*), French (*Intermediate*)

HONORS AND AWARDS

Award for best user interface as a member of the team, HAI-CO. Jul. 2021
Middle East Technical University, Electrical and Electronics Engineering - Senior Engineering Design Committee

Doç. Dr. Bülent Kerim Altay (BKA) Award Jun. 2021
Middle East Technical University, Electrical and Electronics Engineering

Dean's High Honor Roll 2017-2021
Middle East Technical University

8 times (every semester)

PROJECTS

Optimisation of Statistical Arbitrage in Financial Engineering Present
École Polytechnique Fédérale de Lausanne, Audiovisual Communications Laboratory

Cointegration of the assets, pairs trading and the design of it by the-state-of-the-art signal processing methods are deeply studied to increase the profit of the investments. LS regression and Kalman filtering are also applied for pairs trading. To contribute to the literature, the optimisation of the statistical arbitrage is currently studied and designed.

Ground-Truth Aware Po-Ga Noise Parameters Estimation of Images Jun. 2022
École Polytechnique Fédérale de Lausanne, Computational Photography Project

The purpose of this project is to propose a Poisson-Gaussian modeling for the raw-image of the sensors and propose an algorithm to solve the parameters of this model with the use of observed and ground-truth images. Maximum likelihood solution is derived, and its practical implementation is discussed and two algorithms based on variance and cumulant statistics are proposed. Source: `https://arxiv.org/abs/2210.12142`

Deep Learning Based Discomfort Glare Detection Dec. 2021

École Polytechnique Fédérale de Lausanne, Machine Learning Project

The aim of the project is to use deep learning algorithms to detect discomfort glare from the human facial analysis. This is achieved by CNN architecture with statistical methods. This project is conducted under the supervision of Laboratory of Integrated Performance in Design (LIPID), EPFL. Source: `https://github.com/CS-433/ml-project-2-dikaro_2`

Self-Monitoring for Symptoms Jun. 2021

Middle East Technical University, Design Project

A wearable device as a chest strap and mobile application is designed to monitor COVID-19 symptoms of the user and warn the user about the probability of having COVID-19. Cough, fever and heart rate of the user are automatically detected by the wearable device, while other major symptoms are designed to be logged in via mobile application. The data transmission between wearable device and mobile application is handled by BLE technology. Reports: `https://drive.google.com/drive/folders/1MaDxG5oqLDm_k3GUcDb-XVjIq039IVAj?usp=sharing`

A Lane Adjuster Analog Electronic Circuit for Smart Car Applications Jan. 2020

Middle East Technical University, Analog Electronics Project

The purpose of the project is to model the lane decision according to the type of the car behind it. This model is achieved by analog electronic circuits with certain specifications that are the type and the lane information of the car. All these specifications are processed and generated via signal generator, summing and power amplifier, microphone driver, filter and the logic design circuits. Report: `https://drive.google.com/drive/folders/1KTVoy2drS9z6LeJ5okRTYJryqE7MlAdx?usp=sharing`

CERTIFICATES

Data Science: Data Visualization from HarvardX - edX	Jul. 2021
Digital Signal Processing 4: Applications from EPFL - Coursera	Jul. 2021
Convolutional Neural Networks - Coursera	Sep. 2020
Convolutional Neural Networks in TensorFlow - Coursera	Aug. 2020
Neural Networks and Deep Learning - Coursera	Aug. 2020
Introduction to TensorFlow for AI, Machine and Deep Learning - Coursera	Aug. 2020