PhD Position – Thesis offer (M/F)
Reference: DS_MK_CO2ML_0722

Research topics	**Estimating CO2 Emissions with Machine Learning**
Departement	Data Science Department
Publication date	6th July 2022
Start date	October 2022 or later (ASAP)
Duration	Duration of the thesis (3 years)

Description

This document describes a call for application for a Ph.D.~position with Professor Motonobu Kanagawa at EURECOM.

About EURECOM

EURECOM is a French graduate school in digital sciences located in the south of France near Nice. The candidate will work within the Machine Learning Group in the Data Science Department (https://ds.eurecom.fr/). EURECOM is international and the working language is English.

About the Supervisor

The main supervisor is Dr.~Motonobu Kanagawa (https://sites.google.com/site/motonobukanagawa/), an Assistant Professor at EURECOM. He has been working on statistical machine learning, with a focus on learning algorithms for which theoretical guarantees can be provided. He is interested in how to use machine learning for improving the reliability of computer simulation, with applications including simulations of traffic systems, natural disasters (e.g., tsunamis), finance (e.g., pension systems) and climate economics.

About the Project.

The Ph.D. student will work on a collaboration project between EURECOM and the National Institute of Environmental Studies (NIES) (https://www.nies.go.jp/index-e.html) in Japan. The purpose of this project is to develop an algorithm for estimating CO2 emissions from radiance data observed by a satellite. The overarching goal is to enable real-time monitoring and quantification of the emissions of CO2 (and other greenhouse gases) from various locations on the earth. The tools developed in the project are to be used for purposes related to the mitigation of climate change.

The project involves the following two tasks:

1. Emulation of a simulator that transforms CO2 emissions to radiance observations. While NIES owns such a simulator, it is computationally expensive for repeated use needed for estimating CO2 emissions in real time. Thus, the task here is to develop a surrogate model that emulates and is faster than the simulator; such a surrogate model is called emulator. In particular, this project aims to develop an accurate emulator using machine learning.
2. Estimation of CO2 emissions from radiance observations using the developed emulator. Specifically, this project takes a Bayesian approach, using the emulator for defining a likelihood model. A key challenge here is that the Bayesian estimation has to be done for a large number of locations on the earth simultaneously. To address this challenge, this project aims to develop a Bayesian inference algorithm that is scalable.

While the Ph.D. student will be employed by and mainly working at EURECOM, the student will also work at NIES in Japan for a short term (few weeks to few months) every year. Travel expenses will be covered.

Requirements

- Masters' degree in a relevant discipline (e.g., computer science, mathematics, environmental science).
- Strong background in statistics, machine learning, and data science in general.
- Strong programming skills (e.g., in Python).

Application

Please send the following documents (in English) to motonobu.kanagawa@eurecom.fr
with the Reference: **DS_MK_CO2ML_0722**
The position will be open until filled. (I may not be able to reply individually if there is a large number of inquiries, so I apologize in advance.)

- Curriculum Vitae
- Transcripts for Bachelor's and Master's
- Master's thesis (or draft if not yet completed) or any previous technical reports/publications related to the position.
- Research statement (2 pages max), explaining why you are interested in the project and how you can contribute.
- Contact information of 2-3 references who can evaluate the candidate's ability (e.g., your supervisor for Master's thesis).

About EURECOM

EURECOM is a graduate school and a research center in communication systems located in Sophia Antipolis, a vibrant science park on the French Riviera. EURECOM is ranked among the world's top universities in the QS World University Rankings® 2019, considered one of the world's strongest universities in Computer Science & Information Systems and ranked 551/600 worldwide.

Organized as an Economic Interest Group (kind of consortium), EURECOM brings together in its consortiumprestigious universities such as the schools from the Institut Mines Télécom group (Télécom Paris, IMT Atlantique,Télécom SudParis, etc.), Aalto University (Helsinki), Politecnico di Torino, Technische Universität München (TUM), Norwegian University of Science and Technology (NTNU), Chalmers University of Technology (Sweden), Czech Technical University in Prague (CTU), ITMO University (St Petersburg), University of Liège (ULiège) and EDHEC Business School, as well as industry members such as BMW Group, IABG, Orange, SAP, NortonLifeLock and the Principality of Monaco as an institutional member.

EURECOM has developed its expertise around three major fields: Digital Security, Data Science and Communication Systems. EURECOM is particularly active in research in its areas of excellence while also training a large number of doctoral candidates. Its contractual research, in which its industrial members actively participate, is widely recognized in Europe and contributes largely to its budget. It's strong links with various industries has enabled EURECOM, with the Institut Mines Télécom, to obtain the Carnot label, a label granted to research organizations which put partnership research at the heart of their strategy