



INTERNSHIP PROGRAM FOR INTERNATIONAL STUDENTS

INTERNSHIP SUBJECT FORM

Name of the Host Laboratory	CMAP
Website of the Host Laboratory	https://portail.polytechnique.edu/cmap/fr
Research Group	SIMPAS
Internship Supervisor	Marylou Gabrié
Internship Subject	Interpolation between score-matching and maximum likelihood in supervised learning with Energy Based models.
Student's level	<input type="checkbox"/> Advanced Undergraduate Students (3 rd or 4 th year) <input checked="" type="checkbox"/> Master's students (1 st or 2 nd year) <input checked="" type="checkbox"/> PhD students
Proposed Duration	<input type="checkbox"/> 3 months <input checked="" type="checkbox"/> 4 months <input type="checkbox"/> 5 months <input type="checkbox"/> 6 months
Prerequisites	Machine learning graduate course and previous experience in deep learning implementation are a must. Some knowledge about MCMC methods would be a plus.
Internship description (max. 15 lines)	<p>Maximum likelihood estimation and score matching are two popular methods to train energy-based models [1]. Compared to the second, the first approach offers greater sensitivity to mismatch between the trained and target distributions but, unlike the second, it becomes challenging in generic situations where the trained energy is non-convex. Recently, an algorithm that interpolates between the two methods has been proposed, but so far it has only been tested on simple synthetic examples in a restricted setup [2]. The aim of this project will be to investigate systematically the performance of this new algorithm in a general setup, and test it on more realistic datasets such as MNIST, ImageNet, or Celeb-A.</p> <p>This project would be conducted in collaboration with Eric Vanden-Eijnden, professeur at Courant Institute, NYU.</p> <p>[1] Song, Y., & Kingma, D. P. (2021). <i>How to Train Your Energy-Based Models</i>. 1–22. http://arxiv.org/abs/2101.03288</p> <p>[2] Domingo-Enrich, C., Bietti, A., Gabrié, M., Bruna, J., & Vanden-Eijnden, E. (2021). Dual Training of Energy-Based Models with Overparametrized Shallow Neural Networks. <i>ArXiv</i>, 2107.05134. http://arxiv.org/abs/2107.05134</p>

The boxes marked with cross implies eligible