

Guillaume Couairon

AI RESEARCHER AT INRIA

Paris, France

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I am currently an AI researcher at the ARCHES team (INRIA), where my primary focus is generative methods for weather forecasting.

Education

PhD in Computer Science - Sorbonne Université (ISIR) & Meta AI

TEXT-BASED SEMANTIC IMAGE EDITING *Advisors: Pr. Matthieu Cord and Pr. Holger Schwenk*

Paris, France

Sept. 2019 - July 2023

M.Sc in Computer Science [w/ distinction] - University of Oxford

MACHINE LEARNING, REINFORCEMENT LEARNING, COMPUTATIONAL LEARNING THEORY

Oxford, UK

Sept. 2018 - Sept. 2019

Diplôme d'Ingénieur [GPA: 3.9/4.0] - Ecole polytechnique

MATHEMATICS, PHYSICS, COMPUTER SCIENCE

Palaiseau, France

Sept. 2016 - May 2018

Classes préparatoires MSPI/MP* - Lycée Louis Le Grand

MATHEMATICS, PHYSICS, COMPUTER SCIENCE

Paris, France

Sept. 2013 - July 2015

Selected publications

Very high resolution canopy height maps from RGB imagery using self-supervised vision transformer and convolutional decoder trained on aerial lidar

Remote Sensing of Environment

J. TOLAN, H. YANG, B. NOSARZEWSKI, G. COUAIRON, H. VO, JOHN BRANDT, J. SPORE, S. MAJUMDAR, D. HAZIZA, J. VAMARAJU, T. MOUTAKANNI, P. BOJANOWSKI, T. JOHNS, B. WHITE, T. TIECKE, C. COUPRIE

2023

DiffEdit: Diffusion-based semantic image editing with mask guidance

ICLR (spotlight)

GUILLAUME COUAIRON, JAKOB VERBEEK, HOLGER SCHWENK, MATTHIEU CORD

2023

Zero-shot spatial layout conditioning for text-to-image diffusion models

ICCV

GUILLAUME COUAIRON, MARLÈNE CAREIL, MATTHIEU CORD, STÉPHANE LATHUILIÈRE, JAKOB VERBEEK

2023

The stable signature: Rooting watermarks in latent diffusion models

ICCV

PIERRE FERNANDEZ, GUILLAUME COUAIRON, HERVÉ JÉGOU, MATTHIJS DOUZE, TEDDY FURON

2023

Rewarded soups: towards Pareto-optimality by interpolating weights fine-tuned on diverse rewards

NeurIPS

ALEXANDRE RAMÉ, GUILLAUME COUAIRON, CORENTIN DANCETTE, MUSTAFA SHUKOR, J-B GAYA, LAURE SOULIER, MATTHIEU CORD

2023

FlexIT: Towards Flexible Semantic Image Translation

CVPR

GUILLAUME COUAIRON, ASYA GRECHKA, JAKOB VERBEEK, HOLGER SCHWENK, MATTHIEU CORD

2022

Flava: A foundational language and vision alignment model

CVPR

AMANPREET SINGH, RONGHANG HU, VEDANUJ GOSWAMI, GUILLAUME COUAIRON, WOJCIECH GALUBA, MARCUS ROHRBACH, DOUWE KIELA

2022

Dytox: Transformers for continual learning with dynamic token expansion

CVPR

ARTHUR DOUILLARD, ALEXANDRE RAMÉ, GUILLAUME COUAIRON, MATTHIEU CORD

2022

Embedding Arithmetic of Multimodal Queries for Image Retrieval

CVPRW Oral

GUILLAUME COUAIRON, MATTHIJS DOUZE, MATTHIEU CORD, HOLGER SCHWENK

2022

Efficient vision-language pretraining with visual concepts and hierarchical alignment

MUSTAFA SHUKOR, [GUILLAUME COUAIRO](#)N, MATTHIEU CORD

BMVC

2022

Generating functional protein variants with variational autoencoders

ALEXANDER HAWKINS-HOOKER, FLORENCE DEPARDIEU, SÉBASTIEN BAUR, [GUILLAUME COUAIRO](#)N, ARTHUR CHEN, DAVID BIKARD

PLoS Computational Biology

2021

Research Experience

INRIA

STARTING RESEARCH POSITION *Advisor: Pr. Claire Monteleoni*

- Research into generative models for weather and climate forecasting

Paris, France

Sept. 2023 - now

Sorbonne Université & Meta AI

PHD STUDENT *Advisors: Pr. Matthieu Cord and Pr. Holger Schwenk*

- Zero-shot adaptation of pre-trained text to image diffusion models to image editing, semantic segmentation, conditional image generation from semantic maps

Paris, France

June 2020 - July 2023

Facebook AI Research

RESEARCH ASSISTANT *Advisor: Pr. Holger Schwenk*

- Research into universal sentence embedding spaces and few shot conditional text generation

Paris, France

Sept. 2019 - Jan. 2020

Whiteson Research Lab (WhiRL)

MASTER THESIS *Advisors: Dr. Wendelin Boehmer and Pr. Shimon Whiteson*

- Research into stabilizing the Model-Based Value Expansion algorithm with theoretical insights

Oxford, UK

March 2019 - August 2019

Institut Pasteur

RESEARCH ASSISTANT *Advisor: Dr. David Bikard*

- Research into the potential of deep generative models for Protein design

Paris, France

March 2018 - August 2018

LIX, Ecole polytechnique

RESEARCH ASSISTANT *Advisor: Pr. Frank Nielsen*

- Theoretical work on the Minimum Enclosing Ball optimisation problem: bringing robustness to outliers and generalization to non-euclidean distances

Palaiseau, France

Sept. 2017 - March 2018

Skills

- **Programming Languages:**

- **Packages:**

- **Tools:**

- **Languages:**

Python · Shell · C++

PyTorch · Scikit-Learn · Numpy · Pandas

Linux · Latex · Git · JupyterLab · Weights and Biases

French (native) · English (fluent) · German (intermediate)

Teaching and Talks

SORBONNE UNIVERSITÉ, RDFIA (M2 COURSE), TEACHING ASSISTANT

2022-2023

LA SALLE PASSY BUZENVAL - HIGH SCHOOL, LARGE LANGUAGE MODELS: INTRODUCTION AND OPPORTUNITIES IN EDUCATION

2023

VALEO.AI, RECENT ADVANCES IN SEMANTIC IMAGE EDITING

2023

ECOLE DES PONTS PARISTECH, ZERO-SHOT ADAPTATION OF DIFFUSION MODELS

2022

CVPR, EMBEDDING ARITHMETIC OF MULTIMODAL QUERIES FOR IMAGE RETRIEVAL

2022

HEURITECH, DIFFUSION MODELS: THEORY AND APPLICATIONS

2022

CENTRE DE RECHERCHE INTERDISCIPLINAIRE (CRI), THE REVOLUTION OF IMAGE GENERATION IN ARTISTIC CREATION

2021

Certificates & Awards

- 2023 **DAAD Alnet Fellow**, DAAD Postdoctoral networking tour in Artificial Intelligence, [Link](#)
- 2023 **Outstanding Reviewer Award**, [ICCV 2023](#)
- 2018 **Outstanding Investment Award**, Ecole polytechnique
- 2013 **End of Musical Studies Certificate**, Music Conservatoire
- 2013 **French Team member (substitute)**, International Mathematics Olympiad

Extracurricular Activity

Physical Education Office

Ecole polytechnique, France

CORE MEMBER

2018

- At Ecole polytechnique, all students must join one of the 16 different sport clubs. Initiated a group project to implement an algorithm (with web interface) to optimize this assignment based on individual preferences, performance during selection tests and logistic constraints. 97% of students got their first or second choice.

RSMA-NC

New Caledonia

SECTION CHIEF (FRENCH ARMY)

2016

- Two months officer training, four months in New Caledonia as Section Chief. Was in charge of giving a military training to 40 local people, thereby learning leadership, discipline and cohesion skills.

Music Events organisation

Ecole polytechnique, France

TREASURER

2016

- Treasurer of a society organising music events and festivals (budget : 40000 €)