Offer #2023-06979

Generating artificial design drawings for data-driven 3D modeling

Contract type: Fixed-term contract
Level of qualifications required: Graduate degree or equivalent
Function: Temporary scientific engineer
Level of experience: Recently graduated

About the research centre or Inria department

The Inria centre at Université Côte d'Azur includes 37 research teams and 8 support services. The centre’s staff (about 500 people) is made up of scientists of different nationalities, engineers, technicians and administrative staff. The teams are mainly located on the university campuses of Sophia Antipolis and Nice as well as Montpellier, in close collaboration with research and higher education laboratories and establishments (Université Côte d'Azur, CNRS, INRAE, INSERM ...), but also with the regiona economic players.

With a presence in the fields of computational neuroscience and biology, data science and modeling, software engineering and certification, as well as collaborative robotics, the Inria Centre at Université Côte d’Azur is a major player in terms of scientific excellence through its results and collaborations at both European and international levels.

Context

This project is part of the ANR-NSF project NaturalCAD, which aims at offering sketch-based 3D modeling tools to product designers. Designers are skilled in quickly drawing 3D shapes in perspective. Our goal is to convert these drawings into 3D models expressed as Computer-Aided-Design (CAD) operations. To do so, we plan to cast 3D modeling as a translation task, leveraging modern machine learning algorithms for sequence-to-sequence translation. Our key challenge will be to generate large quantities of training data for this task.

Assignment

We have recently developed algorithms to recognize CAD operations in drawings [1], but so far we have trained these algorithms on simple drawings generated from abstract 3D shapes. In parallel, we have developed an algorithm to synthesize more realistic drawings from CAD data [2]. Our goal is now to combine the two approaches and train our algorithms with high-quality drawings. Scaling to complex drawings will require improvements in the recognition algorithm, as well as in the collection and processing of diverse CAD shapes.

[1] Free2CAD: Parsing Freehand Drawings into CAD Commands
https://geometry.cs.ucl.ac.uk/group_website/projects/2022/free2cad/

[2] CAD2Sketch: Generating Concept Sketches from CAD Sequences
https://ns.inria.fr/d3/cad2sketch/

Main activities

The first step of the project will consist in assembling a diverse dataset of CAD shapes, and in synthesizing drawings from these shapes. Next, we will adapt our recognition algorithm to be trained on these drawings. If time permits, we will collect a few real-world drawings to evaluate our method.

Skills

Familiar with geometry processing and deep learning libraries.

Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
• Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
• Possibility of teleworking and flexible organization of working hours
• Professional equipment available (videoconferencing, loan of computer equipment, etc.)
• Social, cultural and sports events and activities
• Access to vocational training
• Contribution to mutual insurance (subject to conditions)

Remuneration

From 2692 € gross monthly (according to degree and experience)

General Information

• Theme/Domain: Interaction and visualization
• Software engineering (BAP E)
• Town/city: Sophia Antipolis
• Inria Center: Centre Inria d'Université Côte d'Azur
• Starting date: 2024-03-01
• Duration of contract: 6 months
• Deadline to apply: 2024-01-04

Contacts

• Inria Team: GRAPHDECO
• Recruiter: Bousseau Adrien / Adrien.Bousseau@inria.fr

About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

The keys to success

Strong background in programming and applied math.
Knowledge in 3D modeling as well as in machine learning is welcome.

Warning: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.

Instruction to apply

Defence Security:
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy:
As part of its diversity policy, all Inria positions are accessible to people with disabilities.