2021-03729 - PhD Position F/M Learning and evaluating 3D human motion synthesis

Type de contrat : CDI
Niveau de diplôme exigé : Bac + 5 ou équivalent
Fonction : Doctorant

A propos du centre ou de la direction fonctionnelle
Grenoble Rhône-Alpes Research Center groups together a few less than 650 people in 37 research teams and 8 research support departments.

Staff is localized on 5 campuses in Grenoble and Lyon, in close collaboration with labs, research and higher education institutions in Grenoble and Lyon, but also with the economic players in these areas. Present in the fields of software, high-performance computing, Internet of things, image and data, but also simulation in oceanography and biology, it participates at the best level of international scientific achievements and collaborations in both Europe and the rest of the world.

Contexte et atouts du poste

About
The Ph.D. will start in October 2021 and its duration will be 3 years. The Ph.D. will be supervised by Stefanie Wuhrer, Inria Grenoble-Alpes, and Anne-Hélène Olivier, Université Rennes 2.

Location
The Ph.D. will take place within the Morpho research team at Inria Grenoble Rhône-Alpes. The team deals with the capture and analysis of humans from multi-camera studios, and operates its own 68 camera acquisition platform and cluster, http://kinovis.inrialpes.fr. (Example acquisitions are shown in the figure above.) The work is co-supervised with MimeTIC at Inria Rennes, whose research focus includes the simulation of realistic virtual humans.

Inria is a leading French research centre in computer science. The Grenoble centre is located at the heart of the French Alps, a very dynamic region for new technologies offering a large range of recreational activities.

Mission confiée
It has recently become possible to capture time-varying 3D point clouds at high spatial and temporal resolution. However, tools to process and analyze these data robustly and automatically are still missing. Such tools are critical to learning generative models of dynamic human motion, which can in turn be leveraged to create plausible synthetic humans. This has the potential to influence virtual reality applications, such as virtual change rooms or crowd simulations.

The goal of this Ph.D. is to automatically compute high-quality generative models from a database of raw dense 3D motion sequences for human bodies and faces by leveraging deep learning techniques. In particular, the work will focus on two aspects. First, we will study whether co-registration approaches developed for static human scans ([2]) can be extended to dense 3D geometric models in motion. These approaches work based on the realization that the alignment of static 3D data and the generative models learned based on this alignment are interdependent problems, and propose solutions by performing a groupwise optimization over the full training dataset to compute a generative model of high quality. These approaches have received little attention in practice as the optimization is heavy and impractically slow. Hence, extending these works to motion data is challenging due to the mere size of the data. We will investigate whether deep learning techniques can be leveraged to accelerate the groupwise computation. Recently deep learning techniques have started to be used to learn generative models of static 3D human data, e.g. ([4,5]).

Second, the resulting generative models will be evaluated through user studies. When synthesizing human motion, standard distance measurements used in computer vision are limited, as the same motion performed by the same individual exhibits variation. For this reason, we will investigate how to quantify the realism of a synthesized motion using perceptual studies, similar to works that have been performed for collision handling in crowds by involving users in the evaluation loop. We plan to develop both perception and perception/action experimental paradigms, similar to ([5,6]).


Principales activités
See “Assignments”.

Informations générales
- Thème/Domaine : Vision, perception et interprétation multimédia
- Ville : Montbonnot
- Centre Inria : CRI Grenoble - Rhône-Alpes
- Date de prise de fonction souhaitée : 2021-10-01
- Durée de contrat : 3 ans
- Date limite pour postuler : 2021-09-21

Contacts
- Equipe Inria : MORPHED
- Directeur de thèse : Wuhrer Stefanie / stefanie.wuhrer@inria.fr

A propos d’Inria

Inria est l’institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 200 équipes-projets agiles, en général communiqués avec des partenaires académiques, impliquent plus de 3500 scientifiques pour relever les défis du numérique, souvent à l’interface d’autres disciplines. L’institut fait appel à de nombreux talents dans plus d’une quarantaine de métiers différents. 900 personnels d’appui à la recherche et à l’innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde.

Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 180 start-up. L’institut s’efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l’économie.

L’essentiel pour réussir

Only complete applications will be considered.

Please send:
- CV
- motivation letter
- your grades (Bachelor and Master studies)
- the name and contact information of 2 people willing to provide a reference for you (Master’s supervisor or Prof. for instance)

Consignes pour postuler

Sécurité défense :
Ce poste est susceptible d’être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L’autorisation d’accès à une zone est délivrée par le chef d’établissement, après avis ministériel favorable, tel que défini dans l’arrêté du 03 juillet 2012, relatif à la PPST Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l’annulation du recrutement.

Politique de recrutement :
Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.

Attention : Les candidatures doivent être déposées en ligne sur le site Inria.

Le traitement des candidatures adressées par d’autres canaux n’est pas garanti.
Important information concerning the COVID-19 epidemic: in case the rules by the French government and Inria related to the epidemic make it impossible for the candidate to physically start the position at Inria Grenoble, the position will start with teleworking.

**Compétences**

**Candidate profile**

- Master in Computer Science or Applied Mathematics.
- Solid programming skills, e.g. python and/or C++.
- Solid mathematical knowledge in linear algebra and statistics.
- Experience with deep learning and shape modeling is a plus.
- Experience with user studies is a plus.
- Good English level. French is not required.

**Avantages**

- 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 (90 days / year) 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
- Social security coverage

**Rémunération**

1st and 2nd year: 1 982 euros gross salary / month

3rd year: 2 085 euros gross salary / month