
Contexte et atouts du poste

Mission confiée

Scientific Context: The problem of visual localization within large environments using objects as features is the subject of this PhD thesis. Targeted applications are about augmented reality, especially in urban or industrial context. In recent years, research in pose estimation tasks has been dominated by convolutional networks (CNNs). Thanks to these methods, pose of an object can now be directly inferred from the appearance of objects instead of identifying individual surface points [3,4]. These approaches however require an accurate and textured 3D model for the learning stage. On the other hand, using objects as features for pose computation instead of the traditional key-points has emerged recently [1,2]. Based on the automatic detection of objects in 2D images and on the approximation of their 3D shapes with boxes or ellipsoids, these methods are less sensitive to local changes in appearance and to the presence of repeated patterns. If proofs of concepts of such systems exist, the transition to real scenes is not straightforward.

The objective of the thesis is to extend these methods to the case of real large environments where models are known with a limited accuracy and relatively small image datasets are available. We will mainly focus in this work on techniques for rough re-localization, without any knowledge on the camera pose. This is a common practical case in geo-denied environments.

Principales activités

Our aim is to design robust object-base localization methods for real environments, either at a local level (i.e. when the pose is computed from one object) or at a global level, when a set of approximated objects are used for pose computation.

The following lines of research will be addressed: the local level when one object is considered: a recent and promising trend in pose computation is to predict 2D projections of the corners of a 3D bounding box (BB) of the objects [3,4] using convolutional networks. In practice, accurate models are required during the training stage to generate images of the object with various backgrounds, thus avoiding being influenced by the scene context. Extending such works to real datasets requires first to study the influence of the choice of the BB on the results and to define appropriate way for defining the BB. Second, methods have to be defined to generate synthetic images and combine them with real images for training. At an intermediate level, methods allowing to take advantage both from object detection and from classical key-point matching will be designed. A key-difficulty there is that the accuracy of the two kind of features are not the same. In the case of objection detection, defining the accuracy of detection is in itself a problem. Currently, image-model association is based on a set of predefined class of objects. Procedures for automatic detection and reconstruction of prominent objects able to contribute to the robustness of pose computation will be another focus of this work.

Informations générales

- Thème/Domaine : Vision, perception et interprétation multimédia
- Statistiques (Big data) (BAP E)
- Ville : Villers-lès-Nancy
- Centre Inria : CR Nancy - Grand Est
- Date de prise de fonction souhaitée : 2019-09-01
- Durée de contrat : 3 ans
- Date limite pour postuler : 2019-05-01

Contacts

- Équipe Inria : MAGRIT
- Directeur de thèse : Berger Marie-odile / marie-odile.berger@inria.fr

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L’essentiel pour réussir

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Your file should contain the following documents:

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- A short (max one page) description of the following documents:
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- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
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- Access to vocational training
- Social security coverage

Rémunération

1982€ gross/month for 1st and 2nd year. 2085€ gross/month for 3rd year.

Monthly salary after taxes: around 1596,05€ for 1st and 2nd year. 1678,99€ for 3rd year. (medical insurance included).

Applications are to be sent as soon as possible.

In addition, one recommendation letter from the person who supervises(d) your Master thesis (or research project or internship) should be sent directly by his/her author to marie-odile.berger@inria.fr.

Consignes pour postuler

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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.

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