PhD Student Fellowship in Geodesy and Navigation Department

The Geomatics Division of the CTTC is searching for candidates interested in a PhD Student Fellowship contract in its Geodesy and Navigation department. The contract will be funded by the Catalan Government (AGAUR – Generalitat de Catalunya) through the competitive FI call, see http://agaur.gencat.cat/ca/beques-i-ajuts/convocatories-per-temes/Ajuts-per-a-la-formacio-i-contractacio-de-personal-investigador-novell-FI-2019 as a reference.

Project Description:

Followed by recent developments in autonomous driving, robotics, smart cities and augmented reality, 3D sensing has become a significant research trend in the computer vision community. The sensors used for 3D capture provide rich geometric structure. 3D data comes in a variety of forms: range maps, fused RGB-D sequences, meshes and point clouds, volumetric data. Deep learning algorithms recently have been dominated in most computer vision problems, however there is still a gap for 3D point cloud analysis tasks in comparison with 2D images. This gap stems from issues such as complex structure of point clouds and lack of training data. The project is aimed at developing solutions to the above problems, particularly with a focus on weakly-supervised/unsupervised learning algorithms for point cloud analysis. This project will focus on the tasks of segmentation and classification of unorganized 3D point clouds and it will build a robust framework in this area. The aim of this project is to assess and extend upon the state-of-the-art in deep learning, computer vision and geometric algorithms for point cloud process applications. In this project we plan to employ the geometric concepts in deep learning algorithms to construct devices for processing point clouds in various densities. These algorithms will then subsequently be extended for real time classification and segmentation of 3D point cloud data.

The objective of this doctorate is to explore the contribution of geometric deep learning for point cloud analysis to improve current state-of-the-art research work and build real time devices capable of being applied in real world problems.

The proposed PhD project will address the following research questions:

1- How we can apply geometric concepts to build an unsupervised deep learning algorithm for point cloud analysis?

2- Can we extract the topological shape of each region of an object through a part segmentation of a point cloud?

3- How can we provide a compact and intuitive representation of a point cloud?

4- Are generative adversarial algorithms capable of performing robustly on 3D point clouds as on 2D images?

5- Can we fuse different sources of information in a training process based on topological and geometric features of point clouds?

QUALIFICATIONS AND EXPERIENCE

The successful candidate has strong analytical skills, is proactive, self-driven with strong problem solving abilities and out-of-the-box thinking. We are looking for highly-motivated candidates with an interest in performing cutting edge research and a strong desire to learn. Prerequisites for this PhD positions are:

1- Master's degree in Computer Science, Electronic Engineer, Applied Mathematics or any other related majors

2- Solid mathematical/analytical skills

3- Strong Python and C++ programming skills

4- Fluency in English is required (both written and spoken)

5- Familiar with recent computer vision algorithms for detection, segmentation and classification

6- Knowledge in deep learning and experience in deploying neural networks

7- Experience in working with Tensorflow or PyTorch is a plus

8- Familiar with Linux environment

9- Experience with GPU technology is preferred

10- Knowledge in 3D LiDAR point cloud processing and 3D object detection is a plus

11- Ability to work independently while collaborating in a team environment

CONDITIONS

The duration of the contract will be 3 years, starting between March and June 2020. The selected candidates will prepare jointly with CTTC their candidature to be submitted to the competitive FI-2020 call (deadline: October 2019).

Researchers interested in joining the Geomatics Division should send their curriculum vitae and the names and addresses of at least two referees to this online application http://www.cttc.es/career/call-16-2019/.

The deadline is the 10th September 2019.

CTTC

The Centre Tecnològic de Telecomunicacions de Catalunya (CTTC), in Castelldefels – Barcelona, is a growing and well-funded research institution fostering excellence and diversity. CTTC offers a highly international environment at an attractive location. As a

research centre, CTTC provides a fertile environment for research cooperation and innovation between different disciplines.

CTTC seeks to increase the number of women in those areas where they are underrepresented and therefore explicitly encourages women to apply.

CTTC is committed to increasing the number of individuals with disabilities in its workforce and therefore encourages applications from such qualified individuals.