Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : Jean-Charles Créput | Given names :

Status (prof., assistant prof., …) : associate professor HDR

Laboratory :	CIAD (Connaissance et Intelligence Artificielle Distribuées)	Website address : http://www.ciad-lab.fr/
Institution :	University of Technology of Belfort-Montbeliard UTBM, CIAD, F-90010 Belfort, France	Website address : http://www.utbm.fr/

Scientific competence of the supervisor:

Research interests include optimization methods such as metaheuristics and evolutionary computation applied to urban transportation systems, sensing technology and image processing. The research focuses on the development of frameworks and algorithms to address large-scale optimization problems on very large data point clouds and graphs and their implantation on parallel platforms.

Two major publications in the field proposed for the PhD :

1. Beibei Cui, Jean-Charles Créput, Lei Zhang, Self-organizing maps and full GPU parallel approach to graph matching, Computer Communications, vol. 198, pp. 217-227, Elsevier, ISSN 0140-3664. 2023.
2. Abdelkhalek MANSOURI, Jean-Charles CRÉPUT, Wenbao QIAO, Generic parallel data structures and algorithms to GPU superpixel image segmentation, Displays, vol. 74, pp. 1-15, Elsevier, ISSN 0141-9382. 2022.

Website address of the personal page : https://www.ciad-lab.fr/jean-charles_creput/

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Description of the research work proposed for a PhD ***Topic # (see list) :*** I-1, I-2, I-12

Title : Parallel computation models for the optimization and visualisation of very large data point clouds.

Subject :

In order to efficiently solve very large-scale optimization problems with millions of k-dimensional data points, design of new parallel methods combining heuristics and exact algorithms into parallel computing platforms is of great interest. Meshing, triangulation, segmentation and feature extraction and recognition are basic tasks for which massely parallel algorithms are required to alllow real-time execution. These are essential generic tools in combinatorial optimization and pattern recognition applciations. The goal of the thesis is twofold: first, identify prolems and applications in relation to point cloud visualisation and interaction, second, exploit their distributed nature to develop parallel computation solutions into multi-processor systems. Examples of problems are among graph matching, optical flow, routing problems, computer visualisation, object detection and meshing. Extensions of actual solutions could be envisaged by introduction of decision making tools to improve the optimization search. Applications will be in relation to existing laboratory projects.

Keywords :

combinatorial optimization, heuristics, meshing and triangulation, parallel computation

Expected collaborations :

Participation to national working groups (GDR IASIS, RO).

Background required from the applicant :

We will appreciate background in related topics such as combinatorial optimization, parallel computing, and algorithmic geometry.

Existence of a PDF file detailing the proposal ("yes" or "no") : No

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