

Journée scientifique

Jeudi 8 décembre 2022

Amphi COPERNIC

9h00

Accueil et présentation de la journée

Par **Anissa MOKRAOUI**

9h15-10h15 (1 heure)

Innovations et challenges en imagerie du sein

Par **Laurence VANCAMBERG**

General Electric (GE), France

10h15-10h45 (30 minutes)

Network and MAC Cooperative QoS schemes for intra and inter-WBAN data transmission

Par **Saadi BOUDJIT**

Equipe « réseaux »

10h45-11h00 : Pause café

11h00 -12h00 (1 heure)

Apprentissage Frugal Profond pour la Reconnaissance Visuelle

Par **Hichem SAHBI**

Equipe LIP6

12h00-13h30 : Pause déjeuner

13h30-14h30 (1 heure)

Boucle d'automatisation des réseaux logiciels

Par **Stephano SECCI**

CNAM, Laboratoire CEDRIC

14h30 -15h00 (30 minutes)

Sparse Representation Based Classification in the Wavelet Domain

Par **Marie LUONG**

Equipe « multimédia »

15h00-15h15 : Pause café

15h15-15h45 (30 minutes)

Allocation de ressources en prenant en compte la numérogie et le niveau de satisfaction dans 5G-V2X

Par **Thi-Mai-Trang NGUYEN**

Equipe « réseaux »

15h45-16h15 (30 minutes)

Multimodal learning with the few labelling samples: applications with medical images and remote sensing images

Par **Zuheng MING**

Equipe « multimédia »

16h15-16h30 (15 minutes)

Présentations données par les nouveaux doctorants :

(5 minutes et 5 minutes de questions)

Intelligent routing in connected autonomous vehicular networks

Par **ASHRAF Muhammad Mansoor**

16h30

Clôture de la journée

Par **Anissa MOKRAOUI**

Résumé des exposés

Innovations et challenges en imagerie du sein

Par Laurence VANCAMBERG

TBA

Network and MAC Cooperative QoS schemes for intra and inter-WBAN data transmission

Saadi BOUDJIT

The Wireless Body Area Networks (WBANs) carry the promise of expanding the quality of life and care across a large variety of healthcare applications. These wearable health-monitoring systems aim to support early detection of abnormal conditions and prevention of their serious consequences. Patients benefit from continuous ambulatory monitoring as a part of a diagnostic procedure, optimal maintenance of a chronic condition or during supervised recovery from an acute event or surgical procedure. However, to set up such systems several issues along the communication chain should be resolved. The acquisition and dissemination of medical data, the treatment and use of this data either by a local contractor equipment (coordinator of the WBAN) or offset after transfer in 4G/5G and/or Wi-Fi connection to a data server, confidentiality and data security, Quality of Service (QoS) over a WBAN, end-to-end QoS over WBAN's heterogeneous peer-networks, ...etc. are some of the important challenges that should be considered.

This talk focuses on the intra-WBAN data aggregation at the MAC layer and the inter-WBANs cooperation at the network layer with the aim of reducing the energy consumption of the nodes and therefore increase the network lifetime. The Quality of Service (QoS) for WBAN to peer-networks communication will also be discussed through a scheduling technique we have developed at the coordinator of a WBAN to mitigate the waiting time of emergency, high-priority and medical data traffic classes over other classes.

Apprentissage Frugal Profond pour la Reconnaissance Visuelle / Deep Frugal Learning for Visual Recognition /

Par Hachem SAHBI

Deep neural networks are nowadays becoming mainstream in solving many computer vision and image processing tasks including visual category recognition, scene labeling, object detection, depth and motion estimation, etc. The success of these models has been reached at the expense of a substantial increase in their time, memory and energy footprint. With the era of edge devices and intelligent embedded systems, endowed with limited computational resources, a current trend is to make these models lightweight and frugal while maintaining their high accuracy. This presentation discusses progress in frugal (label, time and memory efficient) training of deep neural networks including (i) "active learning" which consists in labeling and ingesting only the most informative data during training, (ii) "pruning" that allows designing lightweight networks as well as (iii) "continual learning" which seeks to update deep networks on large streams of new data without forgetting the previous ones. The applicability of these models is shown through different visual recognition tasks including image and video classification, action and hand-gesture recognition as well as change detection.

Boucle d'automatisation des réseaux logiciels

Par Stephano SECCI

La présentation porte sur des travaux en cours sur la définition d'un framework d'automatisation des réseaux logiciels et son application à l'architecture 5G. Le cadre général de l'évolution des réseaux avec l'introduction de la virtualisation de ses fonctions sera d'abord exposé, notamment en rapport aux nouvelles architectures Open RAN, NFV, SDN et le slicing. Une approche de supervision active de ces infrastructures sera présentée, ainsi qu'une architecture de détection d'anomalies et reconfiguration dynamique faisant usage de données de

supervision et de briques d'intelligences artificielle. Des résultats empiriques issus d'une plateforme 5G ouverte déployée au CNAM seront présentés ainsi que de nouvelles directions de recherche dans ce domaine.

Sparse Representation Based Classification in the Wavelet Domain

Par Marie LUONG

Image classification plays a key role in computer vision and machine learning, mainly because of its success in a wide range of applications including security, manufacturing, and healthcare. As classification is based on knowledge about objects and their classes, a good representation of knowledge will be the important component in a classification method. Many challenges raised in image classification are the issues of data corrupted by noises and occlusions, the lack of data or inadequate data, and the high dimensionality of data. The success of an image classification method relies on the ability of a representation learning method for effectively revealing the meaningful properties of the images. Sparse Representation is such a representation method which has achieved state-of-the-art performance in signal/ image processing. Many Sparse-Representation based Classification (SRC) methods have been proposed in spatial domain with promising results. To improve the performance and tackle the challenges previously mentioned, some classification methods based on Sparse Representation in transform domains such as Wavelet domain and Quaternion Wavelet domain will be presented in this talk demonstrating the effectiveness of the proposed methods.

Allocation des ressources en prenant en compte la numérogie et le niveau de satisfaction dans 5G-V2X

Par Thi-Mai Trang NGUYEN

5G-V2X est une technologie émergente pour les réseaux véhiculaires. L'allocation des ressources radio a un grand impact à la performance du réseau notamment dans le cas où il y a plusieurs types de trafic ayant différentes contraintes de qualité de service. Nous proposons l'algorithme Priority and Satisfaction-based Resource Allocation with Mixed Numerology (PSRA-MN) pour allouer des blocs de ressources aux deux types de trafic, sécurité routière et infodivertissement. Une priorité est donnée au trafic de sécurité routière. Les ressources restantes sont attribuées au trafic infodivertissement en prenant en compte du niveau de satisfaction des clients dans la cellule. La particularité de l'algorithme PSRA-MN est la prise en compte du choix de numérogie, un nouveau concept dans la 5G. Les résultats de simulation montrent une meilleure performance par rapport à l'algorithme d'allocation des ressources standard en termes de taux de demandes allouées, taux de satisfaction et la latence.

Multimodal learning with the few labelling samples: applications with medical images and remote sensing images

Par Zuheng MING

Thanks to the rapid development of the deep learning, we have gained the great progress nowadays on many tasks in the domain of computer vision or natural language processing. Fine-tuning is the most prevalent paradigm of deep learning which transfers the task-agnostic model pretrained on the massive annotated data to the specific task. However, it cannot always have a large-scale dataset in some domain such as medical images and remote sensing images. Not only because labelling the data is a laborious work (such as labelling the segmentation area in the high resolution satellite images) but also because the positive samples are difficult to obtain in some cases (such as the samples of some rare diseases) and these samples need also expertise knowledge to annotate the lesions. Thus, how to transfer the learned common knowledge of the neural networks to the specific tasks with few samples (known also as few-shot learning) is a challenging problem. One possible solution is multimodal learning which can exploit the information in other modalities to compensate the lack of information of current modality by learning the correlations or mutual information between the different modalities, for example learning the general features between CT, X-ray and IRM images for medical images or the common features between the Hyperspectral imaging, LiDAR and SAR for remote sensing images. In this presentation, we would like to give an overview and recent trends of multimodal few-shot learning applying on some specific tasks and outline the limitations. Finally, we try to provide some possible future directions being able to progress the research