Journée scientifique

Vendredi 7 décembre 2020

(Présentations en mode hybride)

13h30

Accueil et présentation de la journée

Par Anissa MOKRAOUI

13h35

A learning sparse representation based approach for medical image distortion's classification

Par Tan Sy NGUYEN

Stagiaire de l'équipe « multimédia »

14hh00

Wavelets in the Deep Learning Era

Par Jean-Luc STARCK

Directeur de recherche, CEA Paris Saclay, Département d'Astrophysique

14h45

Optimisation de placement et chaînage de fonctions réseaux selon le paradigme SDN/NFV

Par Issam IKHLEF

Doctorant de l'équipe « réseaux »

Détection, classification et suivi d'objets par apprentissage sur des flux d'images Application au renseignement aérien.

Par Pierre LE JEUNE

Doctorant de l'équipe « multimédia » et « A3 » (LIPN)

Amélioration de la qualité de service dans le contexte de Fog avec l'optimisation des placements

Par Amira BENAMER

Doctorante invitée de l'équipe « réseaux »

15h15h-15h30 : Pause café

15h30

Optimization of routing and protection in communication networks

Par Fen ZHOU

Professeur IMT de Lille Douai

16h15

Laparoscopic Videos Quality Assessment and Enhancement

Par Osama GHARBI

Stagiaire équipe « multimédia »

16hh40

Séparation aveugle de sources images: cadre théorique et applications à l'imagerie médicale et au patrimoine numérique

Par Xhenis COBA

Stagiaire de l'équipe « multimédia »

17h05

A Smart System for Processing and Analyzing Gastrointestinal Abnormalities in Wireless Capsule Endoscopy

Par Tan Sy NGUYEN

Doctorant de l'équipe « multimédia » et équipe « MBI » (LAGA)

17h15

UAVs-Based Mobile Radars for Real-Time Highways Surveillance

Par Fatima Zahra RABAHI

Doctorante invitée de l'équipe « réseaux »

17h40

Clôture de la journée

Par Anissa MOKRAOUI

Résumé des exposés

Tan Sy NGUYEN

A learning sparse representation based approach for medical image distortion's classification

We propose an effective Convolutional Autoencoder (AE) model for Sparse Representation (SR) in the Wavelet Domain for Classification (SRWC). The proposed approach involves an autoencoder with a sparse latent layer for learning sparse codes of wavelet features. The estimated sparse codes are used for assigning classes to test samples using a residual-based probabilistic criterion. Intensive experiments carried out on various datasets revealed that the proposed method yields better classification accuracy while exhibiting a significant reduction in the number of network parameters, compared to several recent deep learning-based methods. Besides that, the extension opens the idea of using both low and high frequency subbands to create a better multi-branch model which avoids ignoring the important features of the original image. Some parameters studies are operated to analyze the effect of corresponding to each subband to the classification performance.

Jean-Luc STARCK

Wavelets in the Deep Learning Era

Sparsity based methods, such as wavelets, have been state-of-the-art for more than 20 years for inverse problems before being overtaken by neural networks. In particular, U-nets have proven to be extremely effective. Their main ingredients are a highly non-linear processing, a massive learning made possible by the flourishing of optimization algorithms with the power of computers (GPU) and the use of large available data sets for training. While the many stages of non-linearity are intrinsic to deep learning, the usage of learning with training data could also be exploited by sparsity based approaches. The aim of our study is to push the limits of sparsity with learning, and comparing the results with U-nets. We present a new network architecture, which conserves the properties of sparsity based methods such as exact reconstruction and good generalization properties, while fostering the power of neural networks for learning and fast calculation. We evaluate the model on image denoising tasks and show it is competitive with learning-based models. Over the last few decades, sparse representation modeling has undergone a tremendous expansion with extensive applications in many specialties such as machine learning and computer vision, especially in image processing. In this study, we focused on highly accurate classification methods using the sparse representation framework to enhance the performance of existing methods. Further, our objective is to enhance the classification performance for computer-assisted melanoma diagnosing, performed on dermoscopic images. During this research effort, we have been proposing two novel sparse representation-based methods in the transformed domain, namely Sparse Representation Wavelet-based Classification (SRWC) and Sparse Representation Quaternion Wavelet-based Classification (SRQWC). Our proposed methods outperformed many contemporary methods in terms of classification accuracy.

Fen ZHOU

Optimization of routing and protection in communication networks

This talk contains two parts: routing optimzation in wireless sensor networks (WSNs), and protection in optical data-center networks (DCNs). In WSNs, we studied the problem of maximizing the network lifetime for data gathering tree. To this end, we considered several data aggregation modes, and proposed an integer linear program to obtain the optimal data gathering tree in each mode respectively. In the second part, I will present our work on the service provisioning against disaster failures in optical DCNs, where we considered the survivability of both the service content and the provisioning path. To solve this problem efficiently, we proposed a column generation based method.

Osama GHARBI

Laparosopic Videos Quality Assessment and Enhancement

Il s'agit dans un premier temps d'analyser les données statistiques de tests psycho-visuels effectués sur d'une base de vidéos de chirurgie laparoscopie disponible sur un serveur. Analyse et évaluation des méthodes Machine Learning et Deep Learning pour l'évaluation subjective de la qualité des videos laparoscopique. Proposition d'une solution pour l'amélioration des de la qualité des vidéos qui souffre de l'illumination irrégulier. Proposition d'une solution pour l'amélioration des de la qualité des vidéos qui souffre de la fumée.

Xhenis COBA

Séparation aveugle de sources images: cadre théorique et applications à l'imagerie médicale et au patrimoine numérique

In this project, we propose a new framework for document image restoration based on Blind Source Separation (BSS). The existing separation methods rely on the general properties of source images such as independence, sparsity and non-negativity. Instead of searching for other characteristics for blind image separation, we show that by exploiting some characteristics of image denoising methods in a play-and-plug scheme, efficient BSS results can be achieved. In particular, we show that the BM3D and Non-local Means denoising methods, which exploit the non-local property, lead to better image separation in terms of the convergence rate. Then, we propose to use the dictionary-learning approach to accelerate the algorithm, which takes the visual chirality into consideration. We finally apply the proposed approaches to the document image restoration problem and show the advantages of the proposed approaches through experiments and objective performance evaluation of the proposed scheme.

Fatima Zahra RABAHI

UAVs-Based Mobile Radars for Real-Time Highways Surveillance

Recently, drones also known as UAVs for Unmanned Aerial Vehicles have had a great place in the civil and industrial field. They can be deployed in an ad hoc manner and operate collaboratively within a fleet known as Flying Ad-Hoc Network (FANET). This kind of deployment can be found in some real-time applications where it is difficult to intervene, as it is the case in natural disasters. In our solution, we proposed a new application using drones to help police officers to verbalize drivers on real-time. The idea is to use radar drones to monitor highways against traffic violations and then transmit the captured images to a ground police patrol or to the police data centre. If the UAV fleet is close to the ground Base Station (BS), drones broadcast the captured images directly to the BS. However, if the fleet is far away, the UAVs are forced to go back and forth to the BS while the major issue for UAVs is the limited lifetime of their batteries. To solve this problem and ensure real-time transmission during highways surveillance, we introduced vehicles on the ground as an alternative solution that meets the requirements of our network. This mechanism is called vehicles-assisted UAVs Network. For the validation of our proposed model, some simulations have been made using NS-3 simulator. The results of our simulation show that our model is very promising in terms of delay, packet delivery ratio, and energy consumption.