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RG: Registration

OS: Opening Remarks

KN1: Keynote Speech: AI in Cyber Security

Abstract: Recent developments of artificial intelligence (AI) have already had a strong impact on cyber-security technologies. In security products today there is certainly no lack of examples of AI systems capable of extracting key elements from the information flows coming from the network and automatically channeling them to local and remote decision points. These systems are based on the idea of the "telescope", in which a periphery of passive sensors acquires all the information that it can find, and an intelligent system customizes and packages them for local reactions as well as that of remote decision center. A first generation of AI systems following the telescope approach has already demonstrated its potential in various security applications. However, attackers today have learnt to decouple malware infiltration, operation and exfiltration. "Sleeper modules" randomizing hostile activity along time make telescope-based detection more problematic. The second generation of AI systems for cybersecurity is still in a preliminary stage, but it is already leading to a radical change. AI makes it possible to conceive a "cyber-battlefield" composed of geo-space (the physical world), space (satellite and airborne detectors) and cyberspace where (i) humans may not be involved in tactical decisions, and (ii) the information proactively gathered by actions in a part of the environment is used to make automatic decisions (i.e., without going back up a chain of command) in another area. The talk provides an overview of the two generations of AI techniques for cybersecurity and points to some key aspects of the field's evolution.

Bio: Prof. Ernesto Damiani is the Senior Director of Artificial Intelligence and Intelligent Systems Institute, Khalifa University, leader of the Big Data area at Etisalat British Telecom Innovation Center, and Full Professor at Università degli Studi di Milano, where he leads the SESAR Lab. Ernesto Damiani's work has more than 15,500 citations on Google Scholar and more than 6,100 citations on Scopus, with an h-index of 34. His areas of interest include Artificial Intelligence, Machine Learning, Big Data Analytics, Edge/Cloud security and performance, and cyber-physical systems. Ernesto has been a recipient of the Stephen Yau Award from the Service Society, of the Outstanding contributions Award from IFIP TC2, of the Chester-Sall Award from IEEE IES, and of a doctorate honoris causa from INSA - Lyon (France) for his contribution to Big Data teaching and research.

CB: Coffee Break

KN2: Keynote Speech: Advanced Image Processing Techniques for Satellite Remote Sensing

Abstract: There are now many rich sources of satellite data producing high resolution images derived from several modalities and updated at increasing frequency. These include high resolution RGB, SAR, LIDAR as well as multi and hyperspectral imaging. Applications vary widely and include environmental monitoring, agritech and surveillance. Environmental monitoring can include anything from measurement of ice floes, volcanic eruptions and changes to the oceans as well as rapidly evolving urban environments. Agritech applications are being developed to ensure that food production is maximised whilst controlling unnecessary water, fertilizer and energy use. Many applications require information from two different modalities to drive data fusion resulting in informed decision making. The complexity of the decision making combined with the volume, variety and velocity of data requires advanced signal and image processing techniques. These involve data reduction approaches, feature extraction, statistical classifiers, compressive sensing and more recently deep learning approaches to extract the appropriate information from the images. This talk will provide an overview of techniques and applications emerging in this area.

Bio: Prof. Stephen Marshall was born in Sunderland, England in 1958. He received a first class honours degree in Electrical and Electronic Engineering from the University of Nottingham in 1979 and a PhD in Image Processing from University of Strathclyde in 1989. From 1979-81 he worked at Plessey Office Systems, Nottingham as an Electronics Engineer. From 1981-1986 he worked as a lecturer at Paisley College of Technology and he had an exchange visit to University of Rhode Island in 1984. He has been employed at University of Strathclyde since 1986. His research activities have been focussed in the area of Non Linear Image Processing. In this time, he has pioneered new design techniques for morphological filters based on a class of iterative search techniques known as genetic algorithms. The resulting filters have been applied as four-dimensional operators to successfully restore old film archive material. In recent years he has established the Hyperspectral Imaging Centre at the University of Strathclyde. The aims to provide solutions to industrial problems through applied research and Knowledge Exchange. He has published over 200 conference and journal papers on these topics including IET, IEEE, SPIE, SIAM, ICASSP, VIE and EUSIPCO. He has also been a reviewer for these and other journals and conferences. He is a Fellow of the Institution of Engineering and Technology (IET) and a Senior member of the IEEE. He has also been successful in obtaining research funding from National, International and Industrial sources. These sources include EPSRC, EU, BBSRC,NERC and Innovate UK. Stephen Marshall is also the lead academic for the Vertically Integrated Project Program.

PD: Panel Discussion: Latest Trends in AI for Signal Processing and Information Security

L: Lunch

S1: Session 1

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CB: Coffee Break

S2: Session 2

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CB: Coffee Break

CS: Closing Session