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Pervasive Computing Group

Institute of Networked and Embedded Systems / Klagenfurt University

Guest Lecture „Artificial Vision“

Prof. Gian Luca Foresti and Dr. Christian Micheloni
University of Udine

Abstract:
The lecture series will aim to introduce the techniques for developing advanced artificial vision based systems. From the early stages of image creation to the most advanced techniques for image and video interpretation, the course will presents and discuss the more interesting algorithms for detecting objects and understanding their behaviors. During the course, real demos will be presented to show the effectiveness and robustness of the artificial vision algorithms on real cases.

Topics:

- Logical architecture of an artificial vision system
- Middle level processing (object recognition, object tracking, etc.)
- High level processing (behaviour analysis, event detection, etc.)
- Multicamera networks
- Applications

Time:

May 07 10am-05pm
May 08 09am-04pm
May 09 09am-04pm
May 14 10am-05pm
Lakeside Park B04a, Room 4.1.01

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Outline:

- Introduction
- Logical architecture of an artificial vision system
  - *Low level processing* (object segmentation, object detection,etc.)
    - Image differencing (Frame-Background, Frame by frame, etc.)
    - Background Updating
    - Thresholding
    - Image registration (Translation, Affine, Perspective)
    - Feature-based image registration (Feature tracking, Outlier detection, Transform Computation)
  - *Middle level processing* (object recognition, object tracking, etc.)
    - Shape analysis
    - Neural networks and Neural trees
    - Space projection (Principal Component Analysis, Linear Discriminant Analysis, etc.)
  - *High level processing* (behaviour analysis, event detection, etc.)
    - Explicit and probabilistic event definition
    - Simple and complex event detection
    - Feature extraction
    - Trajectory analysis and clustering
    - Scene understanding
- Multicamera networks
  - Distributed sensor networks
  - Sensor selection
  - Data and information fusion
- Applications
  - Human behaviour understanding
  - Face detection
  - Face recognition

Language: English

Exam information: Written exam

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Biosketch

Gian Luca Foresti received the laurea degree *cum laude* in Electronic Engineering and the Ph.D. degree in Computer Science from University of Genoa, Italy, in 1990 and in 1994, respectively. Since 1998 he is Professor of Computer Science at the Department of Mathematics and Computer Science (DIMI), University of Udine, and Director of the Artificial Vision and Real-Time System (AVIRES) Lab. He main interests involve (a) active vision, (b) image processing, (c) multisensor data fusion and (d) artificial neural networks.
Techniques proposed found applications in the following fields: automatic video-based systems for surveillance and monitoring of outdoor environments, vision systems for autonomous vehicle driving and/or road traffic control, 3D scene interpretation, human behaviuor understanding. Prof. Foresti is author or co-author of more than 200 papers published in International Journals and Refereed International Conferences. He was general co-chair, chairman and member of Technical Committees at several conferences. He has been Guest Editor video of a Special Issue of the *Proceedings of the IEEE* on "Video Communications, Processing and Understanding for Third Generation Surveillance Systems". He has served as a reviewer for several international journals, and for the European Union in different research programs. He is Senior member of IEEE and member of IAPR.

Christian Micheloni received the laurea degree cum laude and the Ph.D. in Computer Science from University of Udine, Italy, in 2002 and in 2005 rspectively. Currently, he is Assistant Professor at the same University. Since 1997 he is a fellow of the Artificial Vision and Real-Time System (AVIRES) Lab at the Department of Mathematics and Computer Science, University of Udine. His main interests involve active vision and artificial neural networks. Techniques proposed found applications in the field of automatic video-based systems for surveillance and monitoring of outdoor environments.
He is member of IEEE.