Biometrics and soft biometrics for people identification

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Imagelab in Modena

- **Imagelab** is a laboratory of pattern recognition, computer vision and multimedia within Dipartimento di Ingegneria dell’Informazione in Modena
- **5 Staff people** (Simone Calderara, Costantino Grana, Andrea Prati, Roberto Vezzani, Rita Cucchiara)
- **10 collaborators** (phd students, research assistants and fellows)
- **3 people in spin-off** (Vision-E srl)
- Imagelab is a part of **SOFTECH-ICT** Software technology for enterprise center in the *High Technology Network of Emilia Romagna* (ICT and Design Platform of technopoles)

Research in:
- People Surveillance/security
- Machine and Robot vision
- Multimedia for cultural heritage and CBIR

See Imagelab site:
http://imagelab.ing.unimore.it
Biometrics and soft-biometrics

• **Soft biometric traits are human characteristics, used by humans to distinguish their peers:**
  – **Physical**: skin colour, eye colour, hair colour, presence of beard, presence of moustache, height, weight.
  – **Behavioural**: gait, keystroke.
  – **Adhered human characteristics**: clothes colour, tattoos, accessories.

• **Soft biometric traits as characteristics that provide some information about the individual, but lack the distinctiveness and permanence to sufficiently differentiate any two individuals.**

• As a support to other biometric systems
• As a first filtering step in forensics, security control, authentication, intruder detection....


**A.K. Jain et al; "Soft biometric traits for personal recognition systems."* Int confon biom. Auth. 2004
1. Imagelab project: BE-Safe

**BESAFE** (Behavioral LEarning in Surveilled Areas with Feature Extraction)
2006-2011

- **Partners:** Hebrew University of Jerusalem (Israel) funded by **NATO** Science for Peace program
- **Goals**: People behavior analysis and identification for terrorism control. Soft biometrics traits: trajectories, gait, speed etc; Tools for trajectory analysis and people similarity search in forensics
People identification in BE-Safe

- Search and people identification with visual similarity
People and face identification in BE-Safe

Extracted High Resolution Faces for Face Recognition

PTZ High Resolution Camera
2. Imagelab Projects: **THIS**

**THIS** (Transport Hub Intelligent video System) 2009-11 EC DG Home Affairs - Prevention, Preparedness and Consequence Management of Terrorism and other Security-related Risks Programme

- **Partners:** AIT (Greece), UPC (Spain), MTA-SZTAKI (Hungary), VITROCISET (Italy), BRIDGE129 (Italy), ZANASI srl (Italy)

- **Goals:** Behavior analysis of people transportation hubs: 2D/3D people identification and re-identification with soft biometric cues
3D re-identification in THIS
3. Imagelab project: Intruder detection

**SSCWS:** Security and Surveillance in Construction Working Sites 2010-11

- **Partners:** Bridge.129 Spa funded by Regione Emilia-Romagna – PRRIITTT
- **Goals:** identification of people and intruders with cameras networks and RFIDs
4. Imagelab project: ViSerAS

- **VISERAS** Video Surveillance as a Service 2011
- **Partners**: IBM, Vitrocisiet, CSP funded by Lepida Spa and Regione Emilia Romagna
- **Goals**: software services modules for public areas security and safety; People detection and face detection; Software development and Integration with IBM-SDK for video analytics and people identification, number plate recognition...
Face detection and similarity search

- Probabilistic multi-layer face detection and similarity search, relevance feedback with boosting classifiers and covariance matrix
Face detection and similarity
5. ImageLab projects: PaAS

• **PaAS** services of identification and authentication in private offices ‘11-’12
  **Partners**: Achanto funded by “Distretti Tecnologici dell’ER” Lab ESSE

• **Goals**: *people detection, and identification in offices, banks and private areas, face recognition; privacy issues, watermarking and secure software for biometrics*
6. ImageLab (old) projects: LAICA and Free-SURF

**LAICA.** (Laboratorio di Ambient Intelligence per una Città Amica) with Comune di Reggio Emilia and Regione Emilia Romagna

**FREE SURF** (FREE SUrveillance in a pRivacy-respectFul way) with Università di Firenze, Università di Palermo, FBK Trento MIUR Project

**Goals:** Face and people obscuration for privacy issues
The ER High technology network

- **Emilia Romagna High Technology Networks**: the Networks of LABS and Technopoles
- **Piattaforma “ICT and Design”**: 5 Labs (Parma, Modena, Cesena, Bologna, Bologna ENEA), companies and technology transfer centers
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