European Association for Signal Processing

Summer school report

13th International Summer School for Advances in Biometric Authentication: Biometrics, Forensic Science and the Quest for Identity

The 2016 Eurasip summer school on biometrics has been held on June 20th to 24th 2016 in Alghero, Italy. This was the 13th edition of a strongly established training course started in 2003 to promote knowledge dissemination and research in Biometrics and related fields. The school was technically co-sponsored by Eurasip, IAPR and IEEE and co-organized by the EU RISE project IDENTITY.

The school main theme was related to the application of multimodal biometric systems in forensic and security applications, but with a specific attention to mobile applications. The school particularly addressed the impact of biometric technologies in criminal investigations and the algorithmic solutions to facilitate the integration of biometrics in operational scenarios.

Several subjects were taught at the summer school forming a total of 24 hours of theoretical lectures from 17 different lecturers and 4 hours of guided practical sessions on face recognition using MatLab[1] tools. The subjects ranged from fundamentals such as machine learning and pattern recognition techniques, applied to biometrics, as well as more advanced topics such as neuroscience and applied subjects such as mobile and wearable devices, large-scale evaluation and the deployment of biometrics technologies in forensic science. This 13th edition of the summer school, featured a line-up of exceptional lecturers, selected from the editorial boards of top-level scientific journals and conferences. Prof. James Haxby, an outstanding neuroscientist, presented a lecture on the representation of visual data in the brain and the topographic mapping to design such representations from fMRI recordings. Dr. Peter Claes, from the University of Leuven, presented a novel and challenging scenario for the prediction of faces from DNA. Prof. John Daugman, a pioneer and inventor of iris recognition, presented a lecture on the epigenetic of iris recognition and the variability of biometric traits based on their measured entropy. All lecturers, among the most highly reputed experts in their fields, presented the most up-to-date view in Biometric technologies and Forensic applications.

The complete list of lecturers and the presented lectures is as follows:

- **Monday June 20**
    - **Prof. Arun Ross** (Michigan State University, USA) *An introduction to biometrics and multibiometrics.*
    - **Prof. Alessandro Verri** (University of Genova, Italy) *Machine learning techniques in biometrics.*
    - **Prof. Massimo Tistarelli** (University of Sassari, Italy) *Face recognition.*
    - **Prof. Davide Maltoni** (University of Bologna, Italy) *Fingerprint recognition.*

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[1] The school committee is grateful to MathwWorks for providing a special trial version of MatLab software, specifically for the school students to develop the practical sessions.

- **Tuesday June 21**
  - **Dr. Peter Claes** (University of Leuven, Belgium) *Predicting Faces from DNA.*
  - **Prof Mark Nixon** (University of Southampton, UK) *Soft biometrics.*
  - **Dr. Thirimachos Bourlai** (West Virginia University, USA) *Practical biometric recognition systems and project - PART 1 and 2.*
  - **Student presentations** (4)

- **Wednesday June 22**
  - **Dr. Jonathon Phillips** (NIST, USA) *Grand challenges in face recognition and visual biometrics.*
  - **Prof. John Daugman** (Cambridge University, UK) *Biometric Entropy, Epigenetics, and Iris Recognition.*
  - **Prof. Alice O'Toole** (University of Texas at Dallas, USA) *Biological Recognition of Human Faces & Bodies.*
  - **Prof. Ida Gobbini** (University of Bologna, Italy) *Mechanisms for Recognition of Familiar Faces.*
  - **Prof. James Haxby** (Dartmouth College, USA) *Commonality of the Fine-grained Structure of Neural Representations across Brains.*
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  - **Dr. Deepak Chandra** (Google Inc., USA) *Mobile authentication in biometrics.*
  - **Dr. Jonathon Phillips** (NIST, USA) *Grand challenges and progress in face recognition and visual biometrics.*

- **Thursday June 23**
  - **Prof. Chang-Tsun Li** (University of Warwick, UK) *Multimedia Forensics and the EU IDENTITY Project.*
  - **Prof. John Mason** (University of Swansea, UK) *Speaker Recognition.*
  - **Dr. Emine Krichen** (Safran Morpho, France) *Exploiting Biometrics: an Industrial Perspective.*

- **Friday June 24**
  - **Prof. Nasir Memon** (New York University, USA) *Touch-based Gesture for Authentication.*
  - **Prof. Didier Meuwly** (Netherlands Forensic Institute, Netherlands) *The Quantification of Forensic Evidence.*
  - **Dr. Thirimachos Bourlai** (West Virginia University, USA) *Practical biometric recognition systems and project - PART 3.*
  - **Prof. Emilio Mordini MD** (CSSC Roma, Italy) *Ethics and Governance of Global ID.*
  - **Prof. Enrico Grosso** (University of Sassari, Italy) *Concluding remarks and discussion.*

41 participants attended the school lectures. The class was formed by students coming from different universities, industries and research centres in the following 22 different countries (in brackets are the number of participants from this country, if greater than one):

- Algeria, Austria (2), Brazil (6), Croatia, France (3), India (3), Ireland, Italy (6), Macedonia, Mexico, Netherlands (2), Norway, Poland, Portugal, Russia, Singapore, Slovenia (2), Spain, Switzerland, United Kingdom (3), USA (2).

This year's students demonstrated a quite deep knowledge of the theoretical background and the application of biometrics to forensic cases as well to other scenarios. Most of them are either working directly in the design of biometric systems, or pursuing high-level scientific research in the field. This not only facilitated a very good interaction between students and lecturers, even within the theoretical lectures, but also stimulated and challenged even the most experienced lecturers with questions and requests for explanations in the course of almost all presentations. As a result, both the students and lecturers have been much involved in technical discussions and plans for collaborations.

All students actively took part in the practical sessions. A project was assigned to group splits of the class and an award was assigned to the best three projects.

Remarkably, also representatives of government agencies and forensic laboratories attended the school courses. This not only denotes the high reputation gained by the school, but also a deep interest of different government offices in the adoption and newer biometric technologies at the service of the citizens.

The school participants were offered the possibility to display a poster on their research activity and to submit a research paper to be orally presented at the special session organized during the week. The participants presented 21 posters, which were available during the entire week. Four Phd students made an oral presentation of their on-going research work:

- **Image Forensics: Authentication of Digital Images**
  Parul Arora - India

- **Recent Studies on Biometrics: Soft Traits, Forensic Recognition and Spoofing Detection**
  Gustavo Botelho de Souza – Brazil

- **Naïve Possibilistic Text Classifier, and its application in Multibiometrics**
  Sayyed-Ali Hossayni - Spain

- **Palmprint recognition via discriminative index learning**
  Jan Svoboda – Switzerland