The term QUIS-CAMPI summarizes the project goals: “Quis” stands for “Who is” and “Campi” refers to “delimited spaces” (plural of campus). Hence, this project focuses on the research and development of a biometric recognition system able to work in fully covert conditions, inside a delimited space, under conditions similar to the currently deployed visual surveillance systems.

**Biometric Recognition in Surveillance Environments**

Recently attacks in crowded urban environments reduced the perception of safety that citizens have, particularly during major sports or social events (due to e.g., 2004 Madrid train bombing, 2013 Boston marathon attacks, 2015 Paris and 2016 Brussels attacks).

It is hard for authorities to confirm whether dangerous individuals are among a crowd, which augments the fear of citizens. To counterbalance this fear, visual surveillance systems are deployed in many cities, but contrary to popular belief there are no automatic techniques to identify subjects without requiring their participation in the data acquisition process. International police agencies have lists of potentially dangerous individuals, which can only be detected by human verification. As an example, the TIDE: Terrorist Identities Datamart Environment from the U.S. National Counterterrorism Center has over 745,000 people listed in the database, whose authorities are willing to arrest.

Hence, the idea in this project was to create systems for automated recognition of humans in crowded environments. To realize this vision, we use coupled visual surveillance and pan-tilt-zoom (PTZ) devices, in order to collect high resolution data from outdoor crowded scenarios.

**Challenege**

Currently, a large number of visual surveillance systems is deployed worldwide. However, their automated analysis is constrained mostly to action recognition (detect fights, suspicious behaviors, unattended luggage...). When it comes to human recognition, the error rates currently obtained in real-world data are far from the desired ones, which is of particular concern for large-scale scenarios. Hence, the current focus is put in the levels of cooperation that are demanded to subjects, in order to obtain input data of minimal quality. The “VeriLook Surveillance” system from Neurotechnology constitutes a significant effort toward the fusion of “biometrics” and “visual surveillance”, but its performance is not considered satisfactory for large-scale scenarios, and still runs in relatively controlled environments, uses high resolution cameras and requires a complex enrolment phase in order to obtain a large set of templates per subject, representing the most typical variations (e.g., differences in pose, lighting conditions and distances).

The main challenges of QUIS-CAMPI with respect to the state-of-the-art in automated surveillance and biometric recognition are:

- **Challenge 1**: With respect to the state-of-the-art in biometrics, research for novel algorithms able to work effectively in data of much lower quality than the currently used in order to collect data that is typical to human recognition.

- **Challenge 2**: With respect to the state-of-the-art in visual surveillance, improve substantially the ability to perform automated biometric recognition, which is now constrained to human intervention.

**GENERAL MOTIVATION AND OBJECTIVES**

Recent attacks in crowded urban environments reduced the perception of safety that citizens have, particularly during major sports or social events (due to e.g., 2004 Madrid train bombing, 2013 Boston marathon attacks, 2015 Paris and 2016 Brussels attacks).

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**WORK DESCRIPTION AND ACHIEVEMENTS**

As a primary result of our work, the main achievements can be divided into four groups: [-] PUBLICATIONS: we published several papers in the international journals with the highest impact factors in the Computer Vision / Pattern Recognition domains (e.g., IEEE-TPAMI, IEEE-TIP, IEEE-TIFS); [-] SYSTEM PROTOTYPE: we have set up live demonstrators of QUIS-CAMPI prototype in international conferences (e.g., BTAS); [-] DATASETS: we made available a new data set (http://quiscampi.di.ubi.pt/) that can be used by any researcher interested in this field; [-] SCIENTIFIC COMMUNITY: we organized an international contest in the scope of a premium conference in the biometrics domain (ICB), to promote research projects in unconstrained biometric recognition in surveillance environments, gathering biometric researchers and forensic scientists/practitioners (papers presented at the International Workshop on Biometrics and Forensics).