



GDPR Compliant People Detection and Counting using Thermal Cameras

This solution enables decision-makers to acquire useful information on the people behaviour in different scenarios from tourism management to customer presence analysis through people detection and counting with a solution:

- **respecting GDPR** (General Data Protection Regulation),
- **does not require physical/invasive infrastructures** (ex tripod gates) for the people to be monitored,
- **easy installable** in city centre's plazas, malls, stadiums etc.
- **Artificial Intelligence powered** over the state of the art of the field
- **capable to work** in low light and/or **night**, indoor and outdoor conditions.

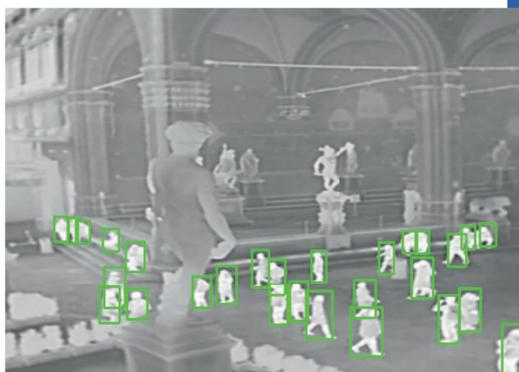
Tourism is, without doubt, a vital component for many cities, however, managing it is a difficult task and many problems such as overcrowded situations can get in the way and lead to reduce the appreciation of the touristic site experience.

In some cases, the municipalities have adopted some **limitations on the number of people** presences in the major city squares and areas, in order to maintain acceptable the quality of experience and services for all the categories of city users, and thus also for the tourists. The limitations are typically imposed by tripod gates, tickets, and other physical/invasive solutions which also reduce the free people flows. Other solutions do not respect the people privacy. In order to detect, classify and count the number of people in the specific area of interest there are nonintrusive solutions based on different technologies such as People counter IoT sensor, which may have limited range capabilities in terms of people density and distance from the sensor.

The solution proposed in this Technical Notes by Snap4City is based on **thermal cameras**. It allows people detection and counting **without range capabilities restrictions, preserving the privacy of people in a non-invasive** way and is also **easy to install**.

For example an installation has been applied in the major square regarding tourists' presence in Florence, Italy, Piazza Della Signoria using two thermal cameras to monitor the people presences.





People Detection

Artificial Intelligence classification performance

How to install

Monitoring Dashboard

The green boxes reported in the images correspond to the detected people in the scene. The data acquired can be used to enable the development of different types of applications like the storing of information and the development of monitoring Dashboard.

This **AI** powered solution achieves **state of the art** results on the **detection accuracy**. The tests conducted reported performances starting from 0.98 for scenes with less than 10 people up to 0.88 for scenes with about 100 people.

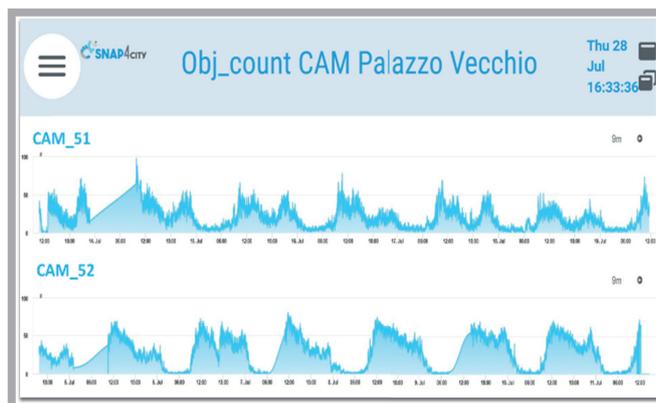
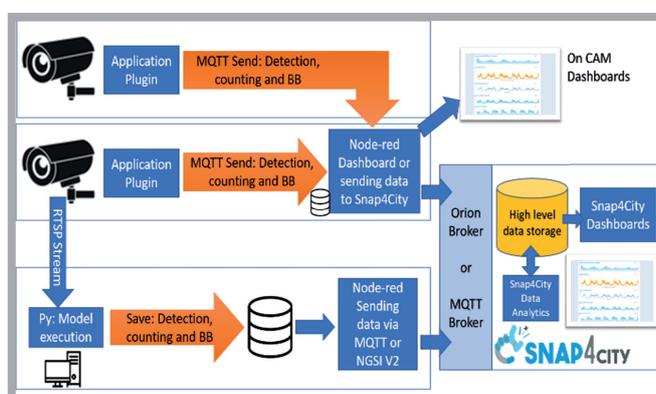
The system for **People Detection and counting** is capable to classify **Pedestrians, Bikes and Strollers!**

The solution can be easily installed:

- On the **AXIS** thermal cameras using the specific Snap4City plugin application, **you can create a network of monitoring;**
- On appliance or cloud **connected via RTSP stream** to the thermal camera.

The solution can be send data on any platform. With Snap4City platform it is possible to get data acquired by the thermal cameras to develop monitoring dashboard for people classification and counting. A number of IoT Devices have been used to receive data and visualize results in dashboards in Real-Time.

The dashboard regarding Piazza Della Signoria reports the trends of the number of people for a week for both cameras, and on which the drill down on time trend can be performed.



Extended version accessible from: <https://www.snap4city.org/805>

Contact: <https://www.snap4city.org>

Partners: DISIT lab, AXIS, Comune di Firenze, Fondazione Ricerca e Innovazione