

BRAINE Use Case 2: Smart City/Campus - Multi-tenant real-time AI video/audio analytics

Use Case 2 is about a Smart City or Smart Campus scenario. This is a typical setting for edge computing applications, in which the edge computing system is used to support both connectivity and video/audio analysis use cases, as depicted in Figure 1. Given the focus on potentially public spaces, the use case is designed to showcase the ability to introduce privacy protection mechanisms in the analysis pipeline, e.g., for anonymization. Furthermore, a key feature of this use case is the ability to introduce third party components in the analysis pipeline.

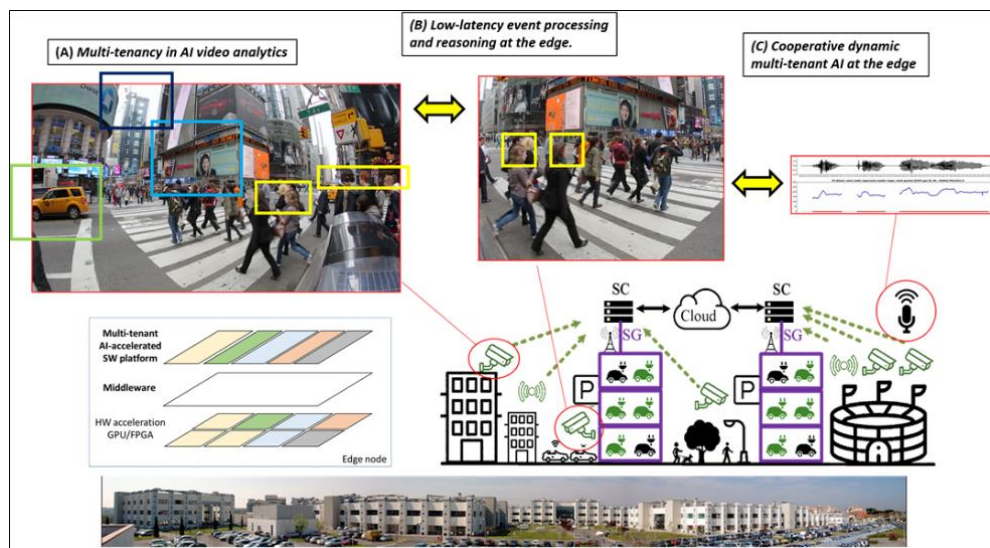


Figure 1: High level application overview

Requirements

- High computing performance at the edge for managing AI applications based on video and audio analytics, and 5G SD-RAN orchestration
- Low latency and HW acceleration support for video streaming and transcoding
- Data privacy, data sharing and platform monitoring
- Multi-tenancy support

Implementation

The use case implements a live stream analytics pipeline, running on the BRAINE EMDC platform, composed of a few high-level blocks, as depicted in the following Figure 2.

BRAINE

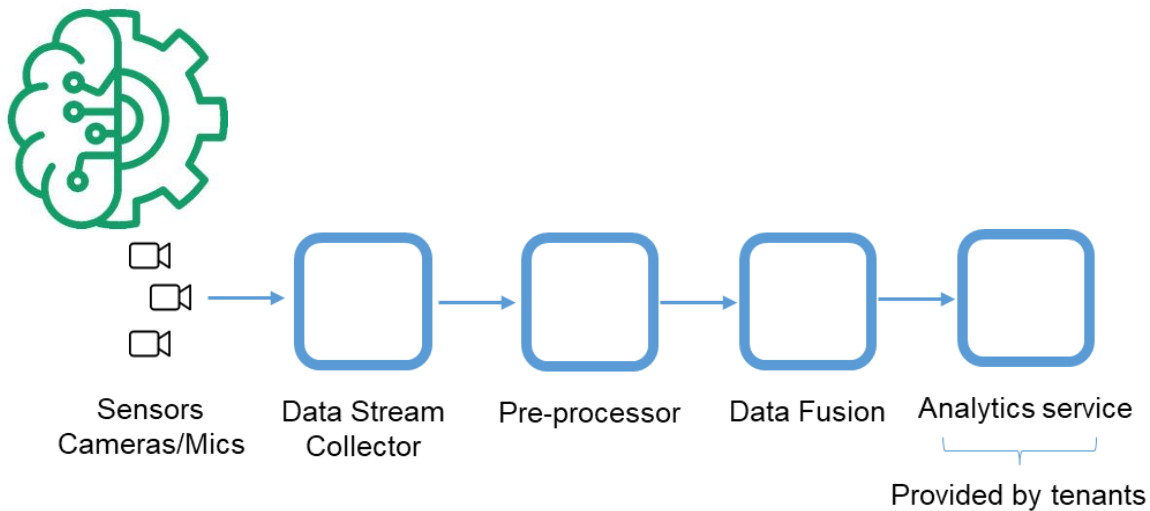


Figure 2: Data pipeline

The pipeline is design to work on live captured traffic, although it might eventually include storage components at different levels. The different processing blocks have heterogeneous requirements in terms of hardware, with the Pre-processor and Analytics Service being the most demanding components. In particular, the pre-processor is generally in charge of video/audio transcoding and transformation. This is a generally expensive computation, which can benefit from widely parallel processor architectures, such as GPUs. Likewise, the analytics components can employ Deep Learning algorithms, which can also benefit from GPUs and other accelerators.

Impact

The use case highlights how the use of the solutions offered by BRAINE can guarantee the realization of services in the large-scale Smart City area, even in case of low-latency applications and with stringent requirements in terms of bandwidth, which also need to manage large quantities of input data in real-time. The solution creates services using distributed audio and video analysis techniques, based on a scalable, heterogeneous, and multi-tenant infrastructure. The application scenarios cover traffic analysis, active surveillance, intelligent transport, and emergency response. The aim is to demonstrate how the use of cameras, distributed throughout the city, can allow the creation of different types of services of interest to a Smart City. In fact, cameras become one of the most versatile sensors if supported by artificial intelligence techniques as they allow the extrapolation of different types of information from the analysis of audio and video flows. In this context, the use of the BRAINE EMDC platform enables the ability to process large volumes of audio and video flows to obtain a large amount of heterogeneous information that can be used for the implementation of different services such as: traffic management, logistics planning, urban space planning, assessment of pollution levels, active management of security and emergency response issues, crowd management and maintenance of city infrastructure.