

## **Knowledge Representation for Multimodal Streaming Data and Data at Rest for Situational Awareness**

Streaming data comes in different forms (video, text, image and other modalities); usually each data modality is represented in its own unique way which permits to analyze and extract patterns and knowledge from these modalities separately but does not allow to discover latent interconnections across the modalities and between their entities and knowledge objects.

In order to capture semantic similarities between the multimodal data, as well as to predict new connections between the knowledge objects already available in store (historically accumulated knowledge and data at rest) and the new data that is streaming in (real-time data), a framework which extends ontological knowledge graph with temporal and spatial relationships will be built.

### Implementation Goals:

1. Work separately on each available data modality to extract available events, detect objects, extract location and temporal data. The methods for feature extraction will depend on the specific modality, pre-trained neural networks (YOLO, GPT-2, GPT-3) can be used for video/ text understanding.
2. Develop mechanisms to build and continuously update the tensor-like knowledge base that will map detected features with the specific point in the knowledge base.
3. Examine different variants of distance metrics to determine the best method of finding related events in the formed knowledge base.

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