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Context & Problematic

- High evolution of heterogeneous data modalities during the last years
- Unimodal Deep Learning solutions lacks an understanding of its surrounding environment
- Determine the appropriate multimodal learning able to cope with multi source of information

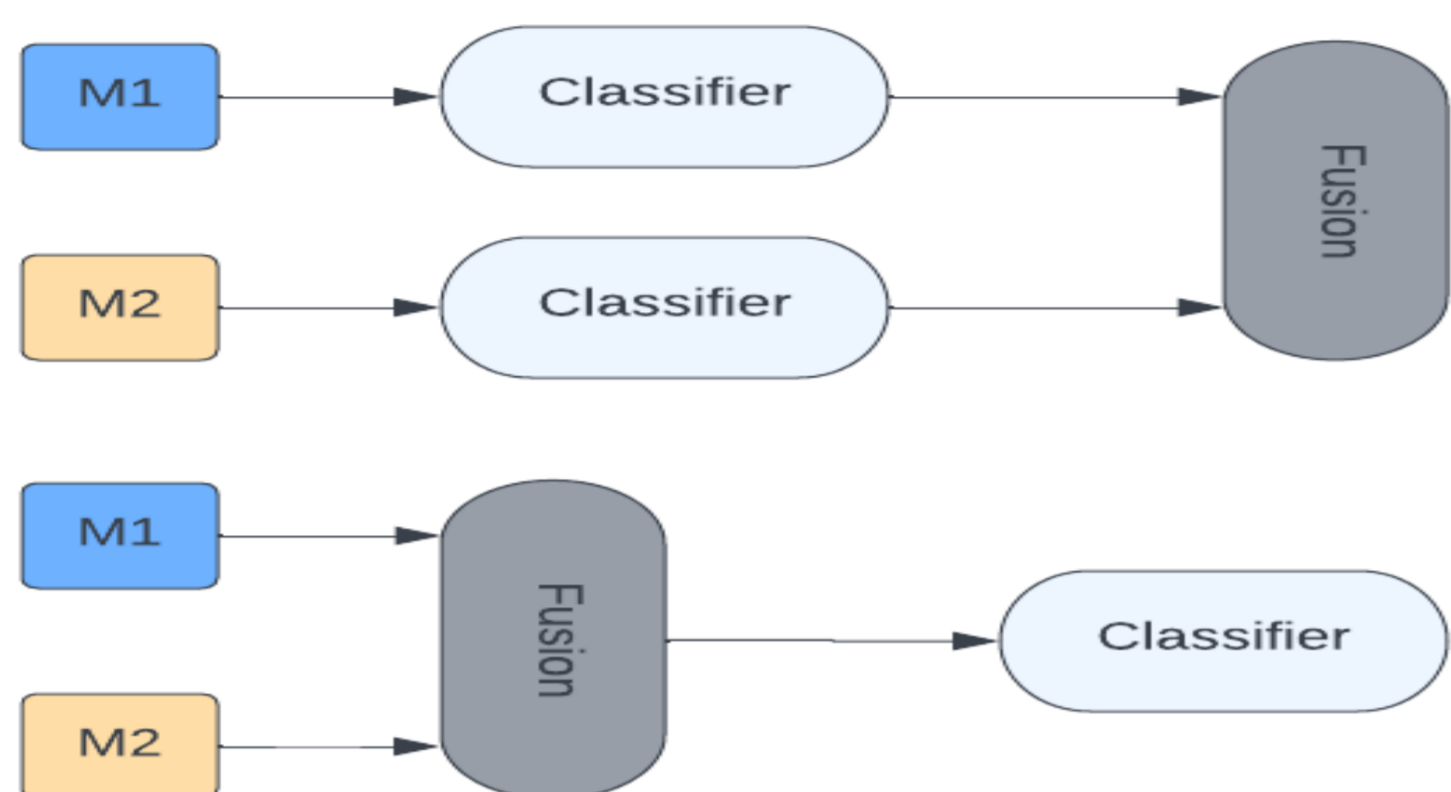
Objective

- Exploiting diverse data sources for action recognition and custom fraud detection



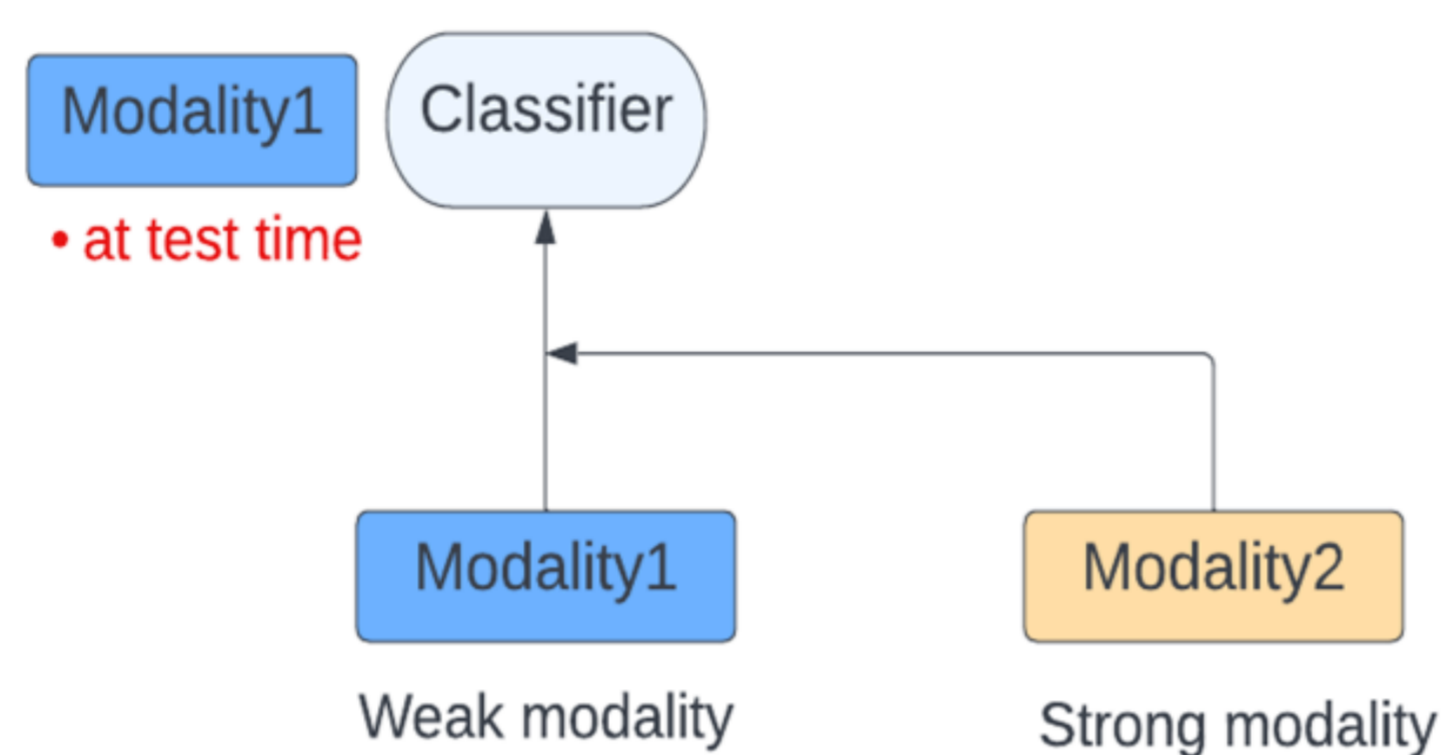
Multimodal Taxonomy

Fusion



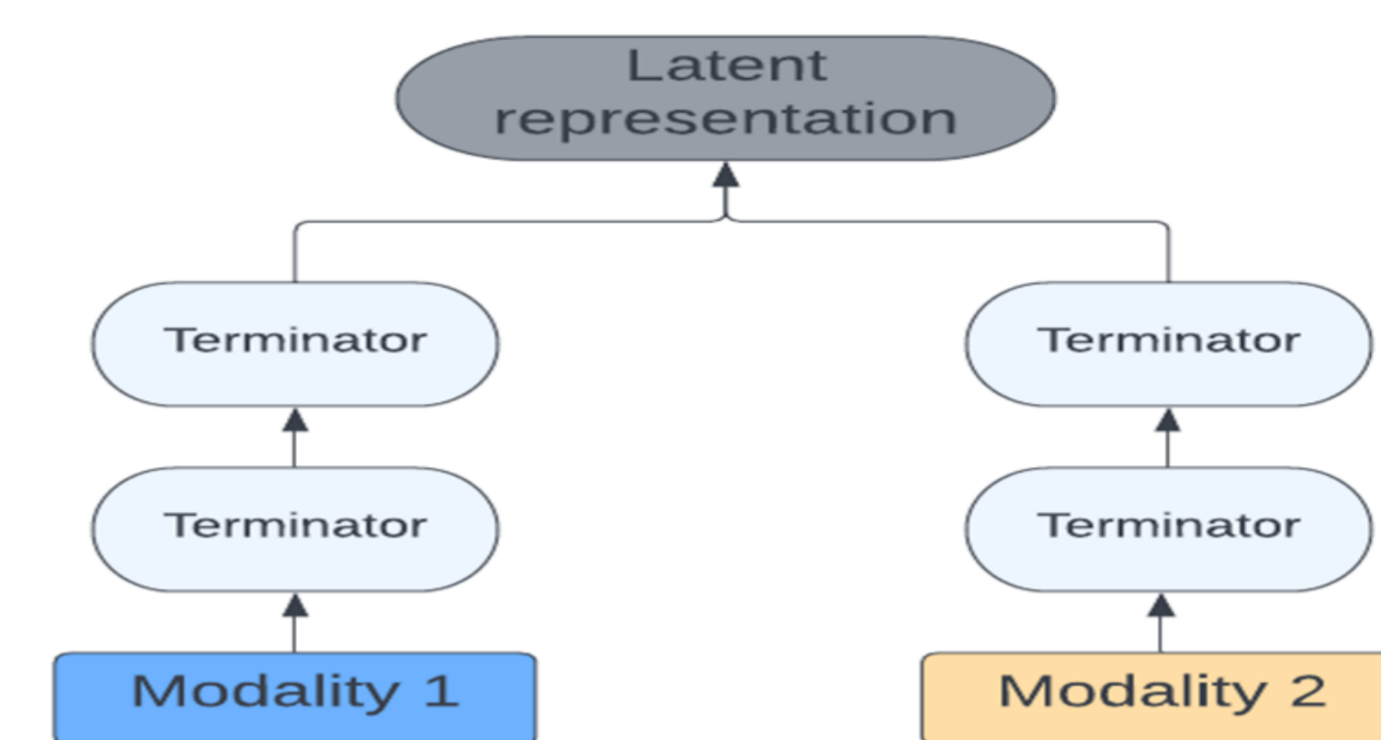
- Late , early , Hybrid are model agnostic fusion

Co-Learning



- Learning enhancement using other modalities

Representation



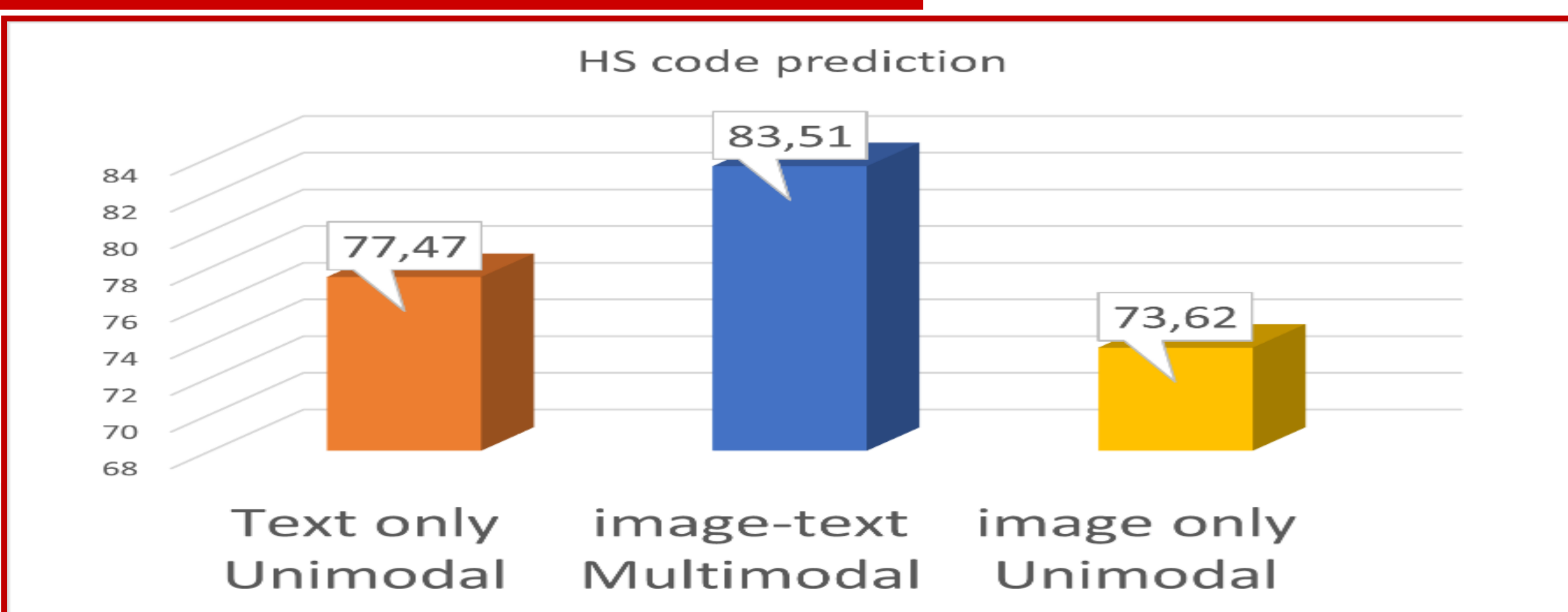
- Representation : joint & coordinated

Use Cases

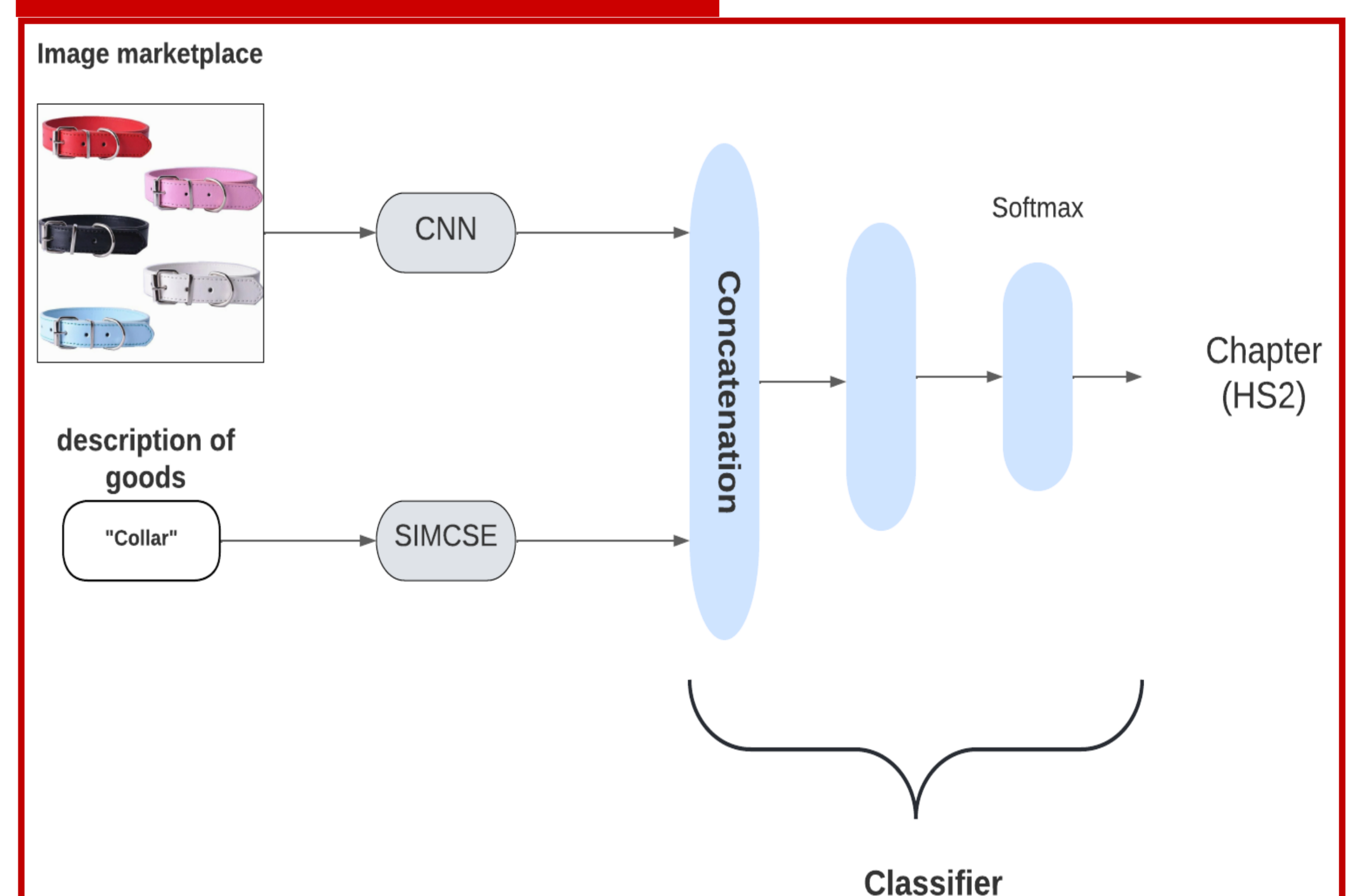
1- Customs fraud detection based on Hs Prediction

- **Dataset:** 1800 customs declarations supplied by e-Origin
 - Each declaration contains valid market-place URL
- **Image descriptor:** pre-trained VGG 16
- **Text descriptor:** pre-trained SIMCSE (bert-based)
- **Multimodal learning type:** Fusion, representation learning

Results : Hs Code Prediction



Model architecture



2- Actions recognition

- **Dataset:** 205 real-world dangerous actions
- **Modalities:** RGB frames, depth map, worker's location, and trajectories
- **Current task :**
 - collecting more data

Perspectives

- Develop models able to cope with missing modalities
- Find the best combination between modalities to improve the model's performance
- Design explainability techniques for the developed models