

Context data added value for situation awareness

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What is Context Data

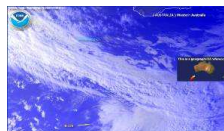
- **A priori** knowledge about the urban environment:
 - Human Intelligence (HUMINT)
 - Open Source Intelligence (OSINT)
 - Imagery Intelligence (IMINT)
 - Geospatial Intelligence (GEOINT)
 - Target Exploitation (TAREX)
 - Document Exploitation (DOCEX)
 - Signal Intelligence (SIGINT)
 - Measurement and Signal Intelligence (MASINT)

Benefits of using Context Data

- Situational awareness from sensor data is a difficult problem. Context data can help to improve the accuracy and robustness of the data fusion algorithms
- Context can provide extra constraints on the movement of objects, e.g.
 - Viable areas on a map
 - Max velocity of an object
- Context data can help to classify and identify objects
- Context data can allow the system to make use of more high-level knowledge such as cultural events

Examples of relevant Context Data

- Terrain Maps
- Road Maps
- Traffic flow directions
- CityGML
- Range of speed of movement of ground objects
- Intelligence to determine the class of a target
- Curfew timings
- Ontologies to represent classes of objects
- City events
- Local habits, behaviours and traditions



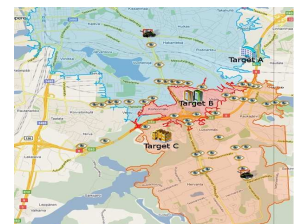
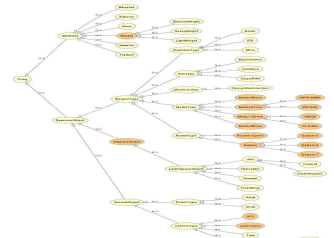
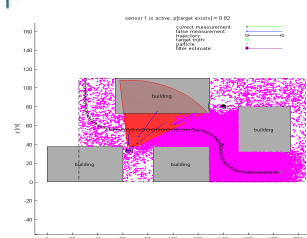
Where Context Data is used in D-FUSE

- **Geographical Context Data:**
 - WP3, s. 8.6: maps used for classification/recognition
 - WP3, s. 10.5.3: discussion on the use of the CityGML format
 - WP4, ch. 7: a particle filter uses road information & target attributes
 - WP4, App. C: obstacles, doors, walls etc. used to help indoor tracking
 - WP6, s. 4.4.4.5: a road network map used in anomaly detection
 - WP6, ch. 5: missing sensors used as context data in particle filter
 - WP6, ch. 6: maps of the area are used in reachability analysis
- **Symbolic/Numeric Context Data:**
 - WP3, ch. 7: mortar/rocket characteristics used in trajectory calculations
 - WP3, ch. 8: target characteristics used for classification/recognition
 - WP3, s. 10.9: characteristics of ground objects encoded in ontology
 - WP6, ch. 7: potential targets, cultural events encoded in ontology that

Representing Context Data

- Many of the context data types are very different
- How to combine so the intelligence can be compared?
- To do this, we can divide context data into two broad categories:
 1. Geographical and location-based
 2. Symbolic and numeric
- Geo data can be represented using GIS approaches
- Symbolic/numeric data can be represented using databases or ontologies
 - However ontologies provide many advantages over databases

Illustrations of Context Data usage in D-FUSE



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