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AIS IMINT Fusion

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Overview of Talk

- AIS/IMINT Refresher
- Idea of Fusion
- Code Example
- Conclusions

- Slides located at:

http://midnightsignal.com/chile/day_13

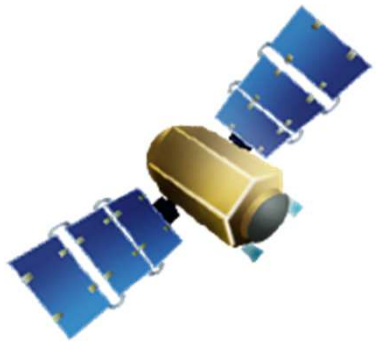
AIS REFRESHER

- AIS (Automatic Identification System)
  - Automated tracking system used on ships and vessels
  - Mandatory on large ships
  - Broadcasts information about the ship
    - Identification number
    - Ship name
    - Geo-location
    - Velocity
    - Cargo

My name is ChileBoat.
I am travelling 10km/hour
I am located at (33 S, 150 W)

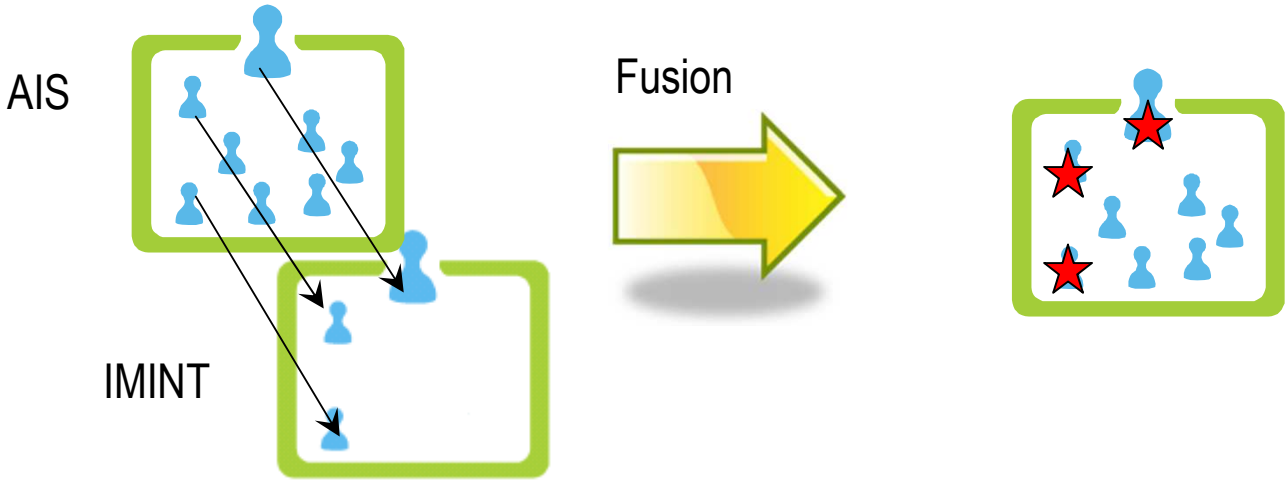
IMINT REFRESHER

- IMINT (Imagery Intellegence)
  - Intelligence gathered via imagery (e.g. Satellite Imagery)
  - Possible to contain information such as:
    - Geo-location
    - Heading
    - Size



AIS IMINT Fusion

- Fusion of two distinct intelligence sources to create a more complete picture of the environment
- Can be used to confirm IMINT detections of ships
- May find vessels which are large enough to have AIS, but do not have it enabled
  - Law enforcement may want to investigate



OpenCV Matching

- OpenCV provides methods to
  - Find “Keypoints” in an image
    - Keypoints are interesting points in an image that are likely to be found in various lighting conditions and scales/rotations of the object
  - Compute “Descriptor” vectors from those keypoints
    - Descriptors are vectors that describe the keypoints mathematically. (e.g. mean, standard deviation... etc of the area surrounding the keypoint)

OpenCV Matching

- Basic flow of matching
  - Find keypoints of image (using SIFT/SURF/HarrisCorners... etc)
  - Find descriptor vectors from those keypoints (sometimes based on local histograms)
  - Define a metric for distance between descriptors
  - Match descriptors from one set with descriptors from another set in a way that minimizes the distance

CODE EXAMPLE

OpenCV has classes for matching descriptors

We can use these classes to develop a simple AIS/IMINT correlator

We used the BruteForceMatcher for this example. There are a few more with different functionality... check out the documentation for more information.

Open AIS_IMINT_FUSION.zip

CODE EXAMPLE - DIAGRAM