



AIS IMINT Fusion

Mr. John Stastny
SPAWAR Systems Center, Pacific

Mr. Bryan Bagnall
SPAWAR Systems Center, Pacific

Mr. Lucas Keenan
SPAWAR Systems Center, Pacific

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Overview of Talk

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

ALS Refresher

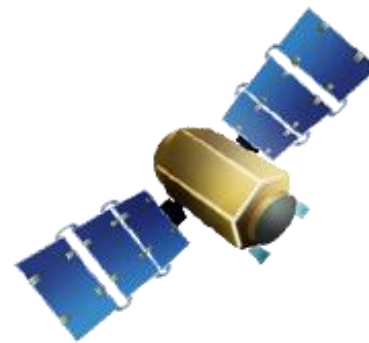
- **ALS (Automatic Identification System)**
 - Automated tracking system used on ships and vessels
 - Mandatory on large ships
 - Broadcasts information about the ship
 - Identification number
 - Ship name
 - Geo-location
 - Velocity
 - Cargo

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



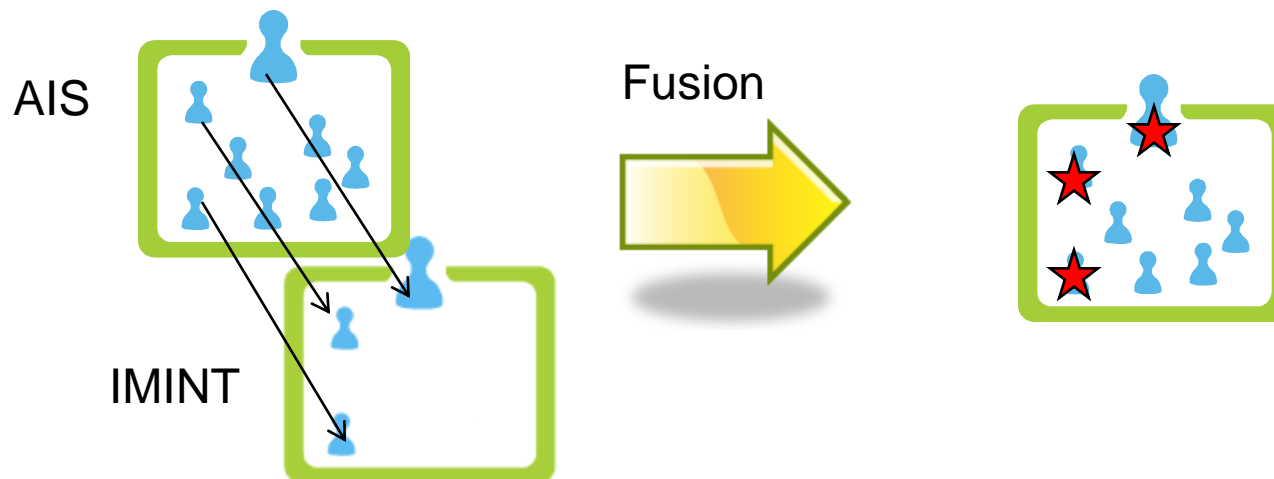
IMINT Refresher

- IMINT (Imagery Intelligence)
 - 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)

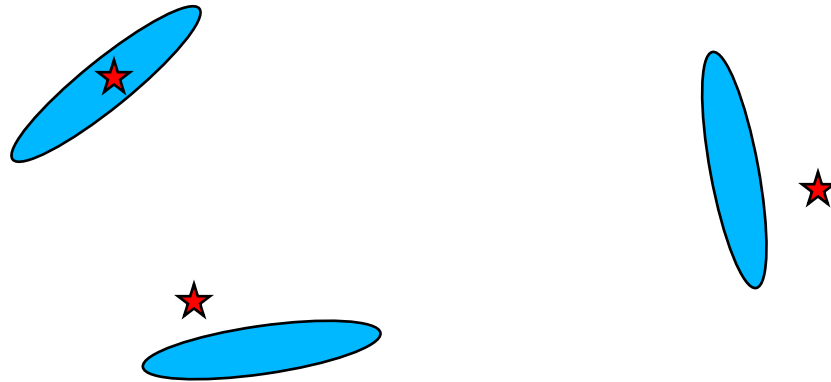
OpenCV Matching

- 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



Legend

AIS

IMINT