Performance Analysis and Training Tool

MCM demands for target detection

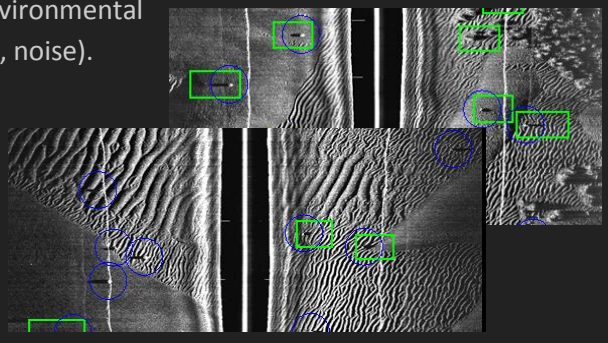
Mine warfare operations rely upon gathering a situational awareness of the battle space in which they operate by utilizing multiple sensors and platforms to gather information. This information is integrated into a single operating picture to allow tactical decisions to be made. High-resolution side-scan sonar provides much of the information to determine the picture of the seafloor. Operators are becoming increasingly aware of the need to quantitatively assess their Mine Counter Measures (MCM) capabilities. It is critical that they meet the ever-increasing demands of the MCM community for certainty when utilizing automated Computer-Aided-Detection/Computer-Aided-Classification (CAD/CAC) models and high-resolution sidescan sonar.

The increasing challenge for MCM operations

The SeeTrack Performance Analysis and Training Tool (PATT) module can be used to assess the MCM capabilities of a complete MCM system. Such capabilities are generally evaluated through expensive sea trials that only use a small number of targets. PATT addresses this problem by inserting multiple simulated mine targets into real side-scan sonar data allowing accurate quantitative estimates to be obtained. These targets have realistic sensor performance qualities imparted to them as part of the process. The capability of an operator or a CAD/CAC algorithm to effectively clear a survey region is quantitatively measured (e.g. probability of detection, probability of false alarm) using this Augmented Reality approach.

Accurately assess target recognition capability

The key to PATT relies on accurately inserting simulated, ground-truth targets into real sensor data. Evaluation results can therefore be obtained against a variety of controlled ground truth parameters such as sonar range, mine type, mine orientation and environmental constraints to the sensor (surface return, shadow, obstruction, noise).



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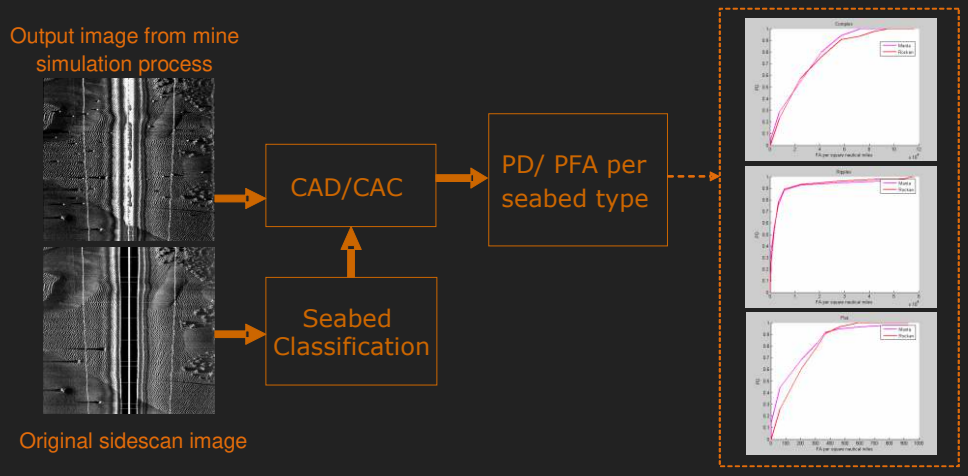
The statistics can then be used to provide a measure of risk of undiscovered mine targets being present in the survey region given the number of targets found using a binomial model. This capability is critical for tactical and operational mission planning and can be used for planning the safest shipping route. PATT may also be used for autonomous underwater vehicle (AUV) re-planning to maximize sensor performance in terms of reliable MCM capabilities. Automated mission planning, risk analysis, and Q-route planning are capabilities which derive the quantitative analysis.



output from the core PATT module.

Train operators

The ability to accurately insert simulated targets into real sensor data also provides the opportunity to train operators in a wide variety of scenarios. The operators performance can be quantitively assessed and areas of weakness developed through further specifc training.

Insert new mine types or IEDs

PATT is provided with a small set of hard-to-detect, standard mine target shapes that are currently used in the system. These models are represented by a height map where each value in the map represents the elevation of the target. 3-D models of mine targets or Improved Explosive Devices (IED's) may be drawn up in a commercial package such as Google SketchUp and then converted into the required PATT format. This ensures that PATT may be constantly upgraded to include new targets when evaluating and training new operators and CAD/CAC models.

Further Details

PATT requires SeeTrack Military and the SeeTrack CAD/CAC module. Further technical details and specifications are available on request.

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