Artificial Precognition and Decision-Making Support for **Persistent Surveillance**

OSCAR
DATA SCIENCE

Objective

A project fielded by the Centre for Defence Enterprise (CDE), on behalf of the Defence Science and Technology Laboratory (DSTL), the objective was to produce a dashboard based monitoring and analysis system that could feed into systems used by the chain of command for situational awareness. Situational awareness is defined as, "the perception of environmental elements and events with respect to time or space, the comprehension of their meaning, and the projection of their future status". Massive Analytic Limited (MAL) used AI to automate the segmentation and classification of groups of subjects, demonstrating these capabilities in a simulated non-combatant evacuation scenario.

As part of the project MAL also researched the applicability of the innovation to different scenarios within defence, security and other areas. The discussions had with several key stakeholders led to an expansion of the areas of application from just non-combatant evacuation to a wide range of defence and security scenarios that would require facial recognition, automated detection of changes from normal behaviour, automated tracking of movement of targets through long range video collectors, gleaning intelligence from streaming social media and integration of dynamic segmentation of assets on a live map.

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Project Details

Primary project elements

This project demonstrated how artificial intelligence can be exploited in a manner that can be easily consumed by end users, in this case for the clustering or grouping of individuals based on proximity and use of communications, as well as for the analysis of video to alert users to dangerous situations. MAL developed an architecture that demonstrated this capability and a visual interface that demonstrated the applicability of this capability and the ways to interact with it to users.

Solution

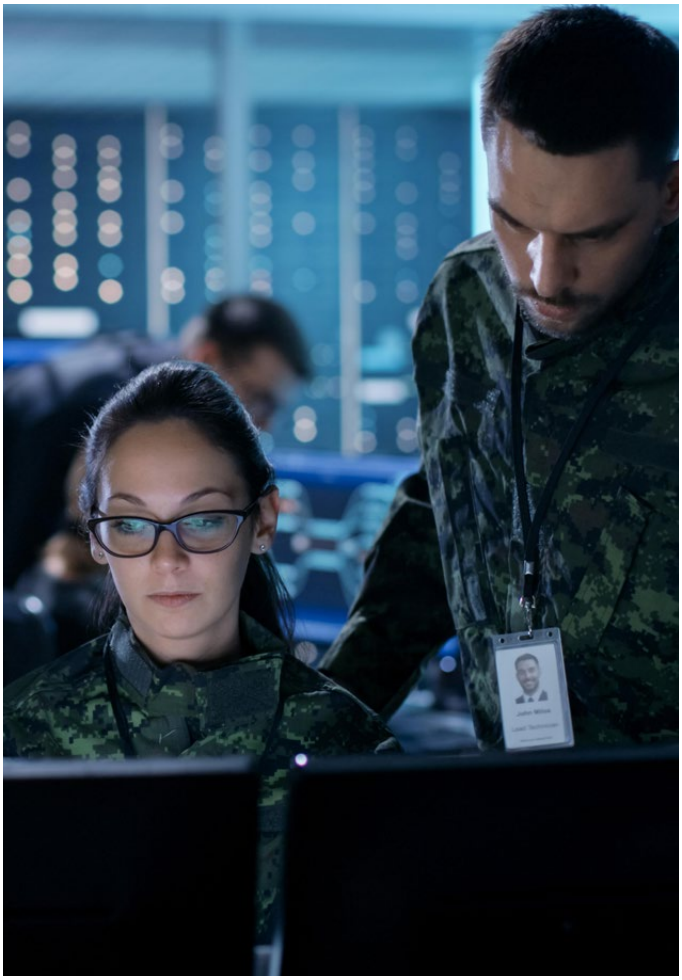
The solution was based on Artificial Precognition (AP) and included machine learning and deep learning for video and statistical analytics. This provided a high level of confidence in the insights generated and an enhanced awareness of the future situation and risk evolution. For instance, the Oscar:DataScience platform (Oscar) was able to dynamically and in real-time cluster entities, based on proximity and use of communication channels.

Furthermore Oscar, as a fully capable big data analytics platform, was able to use all manner of additional data and information generated in the field to enrich the understanding of the situation. Analysts could, for instance, train the system to develop predictive models and reuse the predictive models at will (through a click of a button or automated) to predict on new data - simulating outcomes before they occur.

As part of the solution a frontend was also created that was fast to deploy, provided clear insight, was highly customisable and required little or no training. It allowed users to;

- Upload an arbitrary map
- Display of entities in the correct location as they traverse the map
- Display of communication between entities
- Dynamic grouping of entities, displayed using colour
- Ability to add notes to entities
- Ability to recolour entities
- Ability to play the timeline focusing on a subgroup of entities
- Ability to show current and evolving status whilst recapping previous events
- Ability to increase the persistence of display for communications channels, and to show a “snail trail” for given entities
- Ability to add notes to locations

The result was a platform fully capable of providing persistent surveillance support in multiple theatres, able to automatically cluster and categorise events and elements in real-time on an interactive map for decision support. In addition a video analysis component was also developed (now Nethra:VideoAnalytics) using deep learning. Adding the capability to analyse live video feeds, detect patterns and predict behaviour automatically without human intervention to the persistent surveillance solution.



MassiveAnalytic
The Precognition Company
www.massiveanalytic.com
contact@massiveanalytic.com