

Topic: N131-063

Charles River Analytics Inc.

Crowdsourcing using Intelligent Supervision to address Information Requirements in Crisis Situations (CRISIS)

Charles River Analytics' (CRA's) Crowdsourcing using Intelligent Supervision to address Information Requirements in Crisis Situations (CRISIS) framework employs diversely skilled crowds to address sensing and analysis problems for Navy/ Marine Expeditionary Units (MEU) intelligence analysts. CRISIS incorporates a unique provenance modeling approach to model crowd performance with limited ground truth information, learning trustworthiness for specific tasks. CRISIS is being used to manage skill-based task assignments for intelligence analysts using the Distributed Common Ground System-Navy (DCGS-N), but CRISIS also has broad applications for public data collection in crisis situations, where some contributors may practice deception. CRISIS demonstrated effectiveness using simulated crowds, illustrating its ability to accurately differentiate skill level and deception potential. CRA seeks partners to help bring this technology to military intelligence users and the intelligence community.

Technology Category Alignment:

None

None

None

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SYSCOM: ONR

Contract: N00014-15-C-0151

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N00014-15-C-0151

Department of the Navy SBIR/STTR Transition Program

STATEMENT A. Approved for public release; distribution is unlimited.

ONR Approval # 43-2380-17

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Crowdsourcing using Intelligent Supervision to address Information Requirements in Crisis Situations (CRISIS)

Charles River Analytics Inc.

WHO

SYSCOM: ONR

Sponsoring Program: ONR Code 30

Transition Target: A system within USSOCOM's Media Production Center Portfolio

TPOC:

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Other transition opportunities:

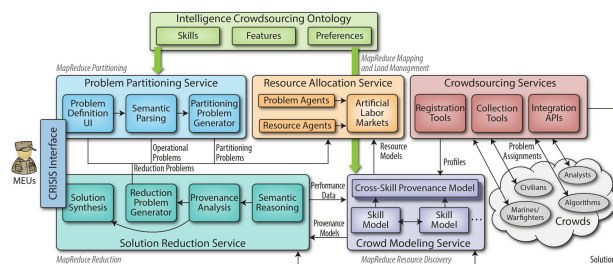
DCGS-Navy; DCGS-Marine Corps;

DCGS-Army; DCGS-Air Force;

National Geospatial-Intelligence

Agency (NGA); Unmanned Aerial System (UAS) Operation Centers

Notes: CRISIS is a crowdsourcing system for employing diversely skilled crowds to address intelligence requirements (IRs) and analysis problems for Marine Expeditionary Units (MEUs). CRISIS currently supports two versions: (1) a public data collection tool focused on crowd sensing using public crowds in crisis regions which may include deceptive contributors; and (2) a secure image annotation/analysis version that helps to manage pools of skilled analysts available for completing intelligence tasks in secure environments, such as DCGS-N or DCGS-MC. The approach uses principles from cloud architectures (e.g., MapReduce) to drive an architecture that enables crowdsourcing to answer intelligence questions in new regions or on new problems more accurately and in less time.



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WHAT

Operational Need and Improvement: MEUs must quickly and accurately obtain and analyze intelligence as first responders in crisis situations (e.g., natural disasters, regional instability). Crowdsourcing can provide the vast, knowledgeable resources needed to efficiently address IRs. However, it requires partitioning problems into manageable chunks for crowd workers, distributing those problems appropriately while considering worker capabilities, and deconflicting the collected results to present intelligence products to MEUs. MEUs need a secure and efficient crowdsourcing framework that can appropriately manage constrained crowds to address evolving IRs.

Specifications Required: The crowdsourcing distributed analytic capability for the MEU commander requires an automated aggregation of crowd responses to support a military response to a crisis. The prototype system should more completely and accurately detect critical details surrounding world events and crisis situations by using human and machine populated cloud architecture and a map reduce processing paradigm. The prototype should demonstrate an increase in the accuracy of a produced answer relative to the assessment produced by an average node.

Technology Developed: CRISIS is inspired by four components of dispersed computing: (1) problem identification and partitioning to provide elements suitable to crowd resolution; (2) resource discovery and analysis to identify contributors with the capabilities needed to address these elements without bias or deception; (3) mapping and load management to efficiently manage available human resources; and (4) solution reduction to merge contributions into actionable intelligence for the MEU.

Warfighter Value: CRISIS provides a proprietary provenance modeling approach to analyze the skill and trustworthiness of contributors while maintaining anonymity and requiring limited ground truth comparison. Using simulated crowds, CRISIS has been able to identify deceptive and biased crowd members with high accuracy (nearing 100%), and has produced significant improvements to the accuracy of collected information. Using live and synthetic tests, Charles River has demonstrated an initial CRISIS capability that reduces error in crowd sensing problems, and provides critical information from a wide range of sources in crisis situations in less time.

WHEN

Contract Number: N00014-15-C-0151 **Ending on:** March 31, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demonstrate CRISIS imagery analysis application	N/A	High-performance using simulated crowd	3	September 2016
Integrate CRISIS with imagery analysis tools	N/A	Successful integration & ability to select analysts	4	November 2016
Demonstrate improved product analysis performance	Low	Extend CRISIS functionality to product analysis	4	September 2017
Demonstrate improved product analysis manager in operational setting	Med	CRISIS field test for product analysis	5	March 2018
Initial integration into relevant program of record	Med	Successful integrated test	6	December 2018

HOW

Projected Business Model: Charles River envisions two key business directions for CRISIS: (1) technology licensing to USSOCOM's Media Production Center to incorporate CRISIS into their systems; and (2) direct licensing to crowdsourcing providers to improve commercial crowdsourcing outcomes. In addition, Charles River would like to provide free licenses to Government and first responder users; we are particularly interested in providing the framework to first responders to improve emergency response and disaster relief outcomes.

Company Objectives: Charles River is seeking partners for transitioning CRISIS to wider use in intelligence applications. The CRISIS framework can improve intelligence processes in a variety of ways, particularly in emergency response situations; therefore Charles River is interested in talking to Military customers who might be interested in exploiting that capability.

Potential Commercial Applications: The CRISIS technology can be used to improve commercial crowdsourcing outcomes and the performance of the systems. Additionally, this technology can be used by the media community to discover information and human responses to challenge questions, resulting in more accurate and complete news media stories. CRISIS also has great applicability to non-governmental organizations challenged with crises response.

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