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NIIRS Acuity and Accuracy Enhancement:
Mitigating Conventional System Shortfalls through On-Station Software Solutions

Background[1]: The aerial imaging community utilizes the National Imagery Interpretability Rating Scale (NIIRS) to define and measure the quality of images and performance of imaging systems. Through a process referred to as "rating" an image, the NIIRS is used by imagery analysts to assign a number which indicates the interpretability of a given image. The NIIRS concept provides a means to directly relate the quality of an image to the interpretation tasks for which it may be used. Although the NIIRS has been primarily applied in the evaluation of aerial imagery, it provides a systematic approach to measuring the quality of photographic or digital imagery, the performance of image capture devices, and the effects of image processing algorithms.

Problem Statement: When an image is taken to be used for identification purposes, by either human or machine, analysts are seeking a greater than 90% confidence level (CL) that the object of interest (OI) within that image is being accurately identified. Physical challenges pertaining to image capture devices (ICD) exist which hinder higher CL feature identification (lower NIIRS grades). Two such challenges are:

- The ICD cannot get physically close enough to the OI to capture necessary identification features for accurate assessment.
- The ICD does not possess a large enough aperture to collect minute identifying features to aid in data point collection.

The combination of the two challenges creates an ICD that must maintain a surveillance distance from the OI with an on-station aperture is that is limited, thus the resultant imagery is in low resolution. Current conventional systems struggle to gather adequate feature intelligence from low grade NIIRS images.

Mission Critical Need: Notwithstanding a leap in on-station capture technology, Customer desires an on-station solution that can provide hyper specificity of feature identification within low-res imagery that can accurately identify OI with a 90-95% CL.

BakerSCI Science & Technologies (S&T) Capabilities: BakerSCI's S&T address and mitigate/circumvent various hindrances of conventional algorithmic, statistical, and data analytic methods and systems through proprietary methods generally titled, Integrated Multi-Paradigm Processing™ (IMPP™). IMPP augments conventional systems' abilities by enabling them to discover substantially deeper data context about the micro and macro data environments. IMPP enables significant amplification of existing capabilities, Data Environment Association and Interaction™; and implementation of new capabilities such as auto-optimizing processing components and self-improving its metacriteria and metaconnections resulting in higher CL decision making.

These capabilities applied in NIIRS is analogous to BakerSCI's ability to evaluate, discover and present to physicians "what is going on in tissue" when a cancer is too small to image with existing resolutions, thus enabling physicians to detect and classify cancers through their effects on the tissue environments.

Generally, BakerSCI's applicable capabilities to this problem can:

- test and determine data, algorithm and signature fitness in both conventional system and BakerSCI system implementations;
- employ *n*--point feature analysis™, where *n is a very large range of variables for the number of data points and their organization that can be analyzed by BakerSCI's S&T;*
- operate linear-based processing methods which can be run at high speeds in a wide variety of environments, including low-bandwidth environments;
- increase CL by allowing SMEs to "tune" BakerSCI's unbiased algorithms with viable and modeling bias;
- create unique signature that are based on the associatedness and behavior of processing results rather than conventional signature creation models;
- employ proprietary methods to create neuronal ensembles from ordered and unordered signature firings and using those ensembles to independently or in amalgamated supersignatures unique to a feature and/or sensor, etc;
- run with proprietary algorithms and data evaluating processes (herein collectively defined as "algorithms") which are: 1) foundational, small and nimble; 2) atypical to conventional statistical and geometric algorithms 3) data / orientation agnostic; 4) unbiased; 5) associatedness and emergence-based/driven;
- run in new and novel software engine processes and designs,

BakerSCI Applicable Use Case Examples (Upon Request)

IMINT; SIGINT; MASINT; HUMINT; Healthcare Imaging and Genomic Research, Diagnostics and Compliance; Financial Intelligence, Transactions and Compliance; Energy Management & Distribution; Ideological Impact & Modeling; Human Performance; Logistics & Transportation.

[1] Pike, S. and Aftergood, S. (1998). Federation of American Scientists. Retrieved on 20 May 2018 from https://fas.org/irp/imint/niirs.htm.