Brainlike Video Data Reduction Overview

Brainlike Inc., has been refining smart sensing methods to reduce clutter in real time on unmanned aircraft sensors. Smart sensing removes camera image clutter, such as clouds, white caps, glint, and camera lens imperfections, allowing features of interest such as ship or marine mammal wakes to show up clearly. Doing so allows small pixel windows containing events of interest to be identified accurately and in real time. As a result, only such windows will be transmitted, telemetry will be reduced, less energy will be used, and small, unmanned aircraft persistence will be increased.

Figure 1 shows one of several camera images that Brainlike, Inc., analyzed in a case study, under contract with the Office of Naval Research. A time series consisting of many such images was captured at a rate of eight per second from a camera turret residing on an unmanned airborne vehicle (UAV). The turret contained six, slightly overlapping cameras. A GPS-based controller was used to register each image on the same ocean area. Each image was made up of 800 by 800 pixels, each having a 12-bit gray scale value. The black regions on both sides of the image were not covered by any of the cameras in the turret.

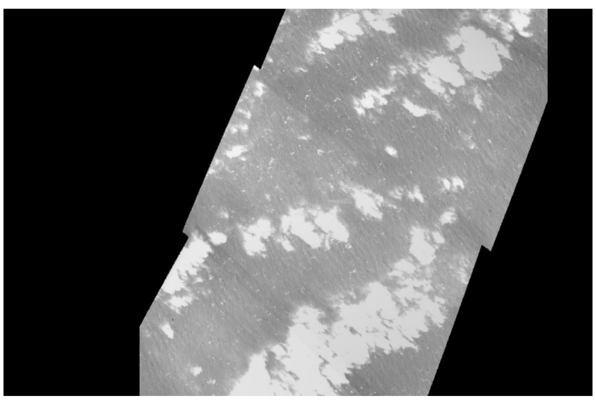


Figure 1. UAV Frame Sensor Data.

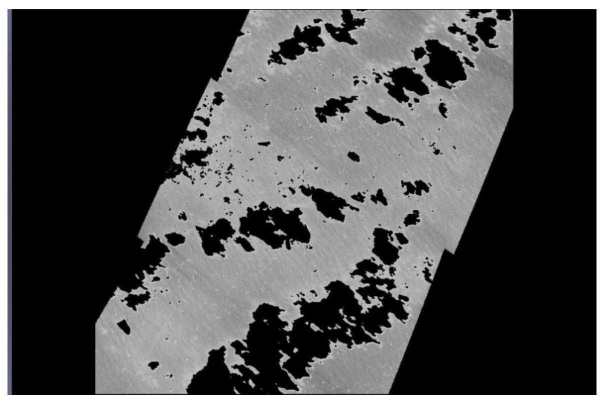
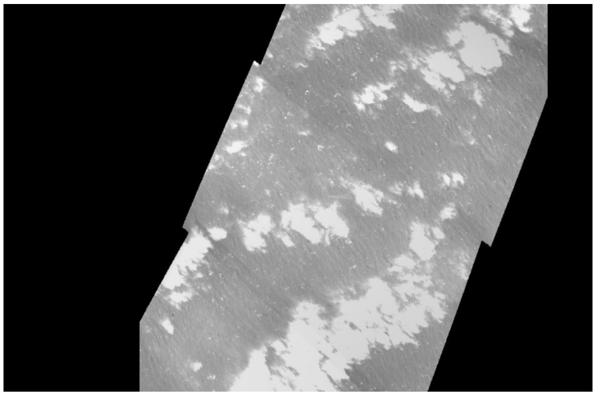


Figure 2. UAV Frame Masked Data.

Once clutter has been masked, events of interest, such as wakes from mammals or vessels, can be detected. Figure 2 shows the resulting, masked counterpart to Figure 1. The Figure 1 image contains a simulated wake, which would be difficult to detect either automatically or visually, in the presence of unmasked clutter. However, the wake would be much easier to detect once such clutter has been masked, by identifying masked windows containing white pixels. The location of the wake is shown in Figure 4, next to its corresponding unmasked image, shown in Figure 3.



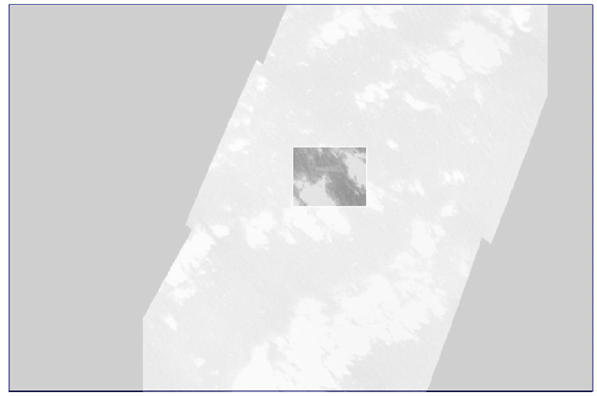


Figure 3. UAV Frame Sensor Data. **Figure 4. UAV Frame Reduced Data.**

Beyond camera image processing, smart sensing techniques can be applied to any number of sensing operations, ranging from sonar-based clutter reduction, to utility, environment, equipment, and health monitoring in commercial applications. In all such applications, Brainlike capacity to reduce data effectively, continuously, efficiently, and affordably, distinguishes it from available alternatives.

In summary, Brainlike sensing receives raw data in real time and reduces it to important information. When integrated with an unmanned aerial vehicle (UAV) camera system, Brainlike sensing can mask pixels containing clouds and other forms of clutter. Brainlike sensing can then identify events of interest such as wakes, effectively and in real time. Resulting benefits include reduced telemetry, increased remote sensor persistence, and more effective target recognition. Video film results, showing the effects of Brainlike processing for the case study in this report, are available from Brainlike Inc., upon request.