1605 Sebring Hills Dr.
Henderson, Nevada 89052

email: information@brainlike.com
website: http://www.brainlike.com/
facsimile 619-393-0364

Automatic Ripple Detection in a Seawater Environment:
A PixMin Case Study

A data analyst configured PixMin to detect small ripples in a VGA-sized input image file, shown in Figure 1. Among the eight ripples embedded in the image, PixMin "level 1 triage" detected seven of them with no false alerts. PixMin "level 2" triage narrowed down and centered detection regions for the seven detected ripples as shown in Figure 2. (The missed target is shown inside the white box in Figure 2.) PixMin "discovery" analysis further highlighted the detected ripples as shown in Figure 3. PixMin also produced output "chips" for each detected ripple, as shown in Figure 4. PixMin code was sufficiently compact to run on a low SWaP, edge-based processor. Resulting chips were sufficiently small for uploading over a low bandwidth transmission line for cloud-based validation, command, and control.

Run time for detecting the targets within the image was about 100 msec, running PixMin debug code on a Pentium 6 laptop. PixMin can run four times faster by processing raw camera images instead of RGB images, as we have done before. PixMin can run even faster by distributing executable instances over multiple cores, as we have also done before. PixMin can run faster still by separating code into parallel threads, which PixMin has been specifically designed to do. PixMin has been developed to run this use-case and many others like it on low SWaP processors, enabling effective and persistent detection at the sensory edge.

A data analyst used straightforward statistics that the PixMin Analyst Development Kit (ADK) routinely produces to configure this use-case. The analyst quickly determined the PixMin configuration that produced these results. Along the way, the data analyst took into account detection precision as well as processing speed. Using these statistics, the data analyst produced these results in less than a day.

Apart from this simple use-case, PixMin may be configured to do the following:

- PixMin can do anomaly detection.
- PixMin can detect changes between images.
- PixMin can pixel-align pairs of sub-images as part of change detection.
- PixMin can standardize images to correct differences in brightness and contrast.
- PixMin can standardize images to correct differences in color.
- PixMin can mask unimportant sub-images.
- PixMin can use detection criteria ranging from simple sums of absolute differences to correlation coefficients.
- PixMin data analysts can configure effective solutions quickly using sparse datasets.

PixMin results don't come in hidden black boxes that require large training samples and iterative training algorithms. Data analysts always know exactly how PixMin detects events, because PixMin templates and other configuration metrics are completely transparent. PixMin can be configured and integrated either by Brainlike analysts or by trained, third-party staff. For more information, feel free to contact us.

Figure 1. An Input Image

Figure 2. An Output "Alert Map"

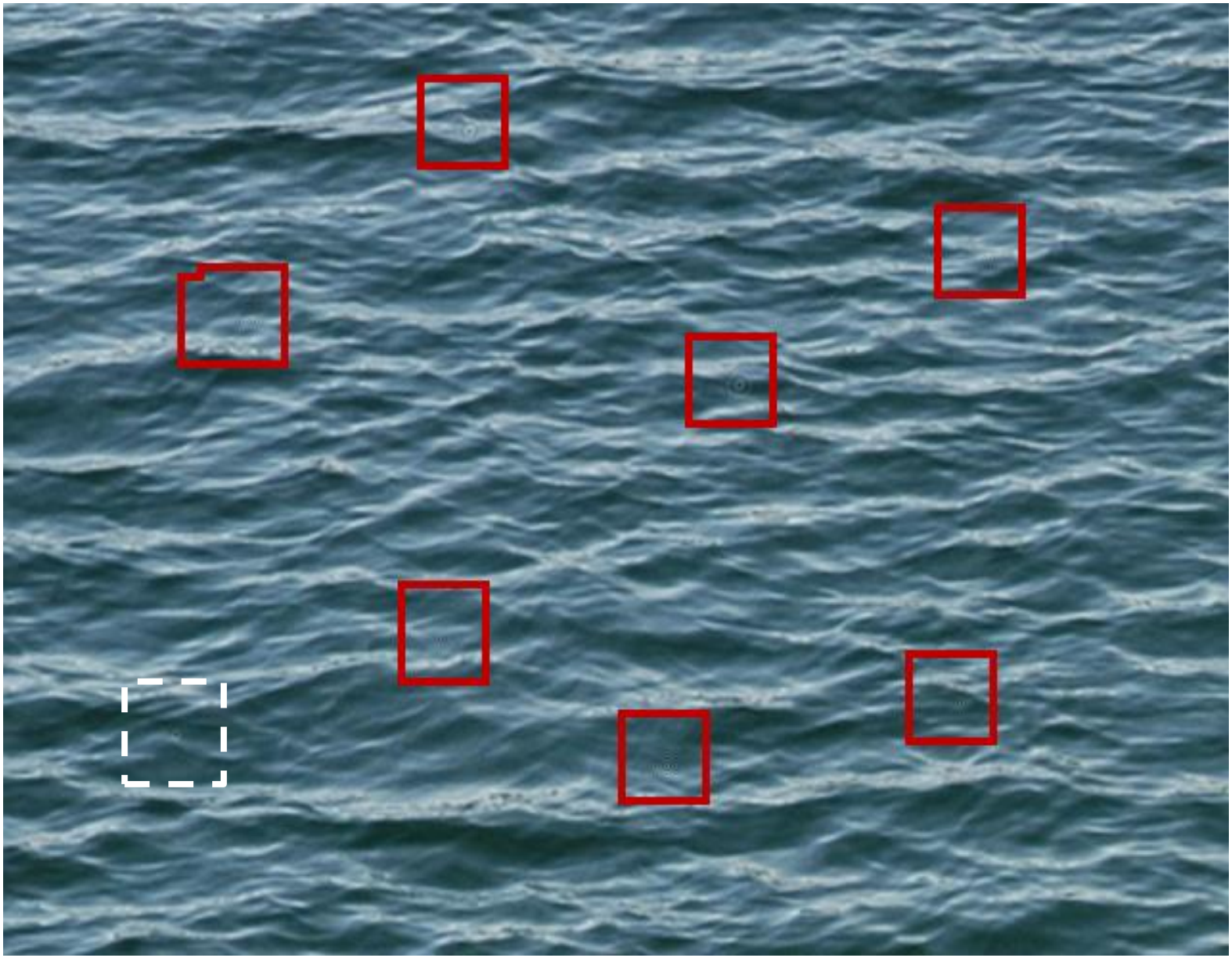

Figure 3. An Output "Discovery Map"

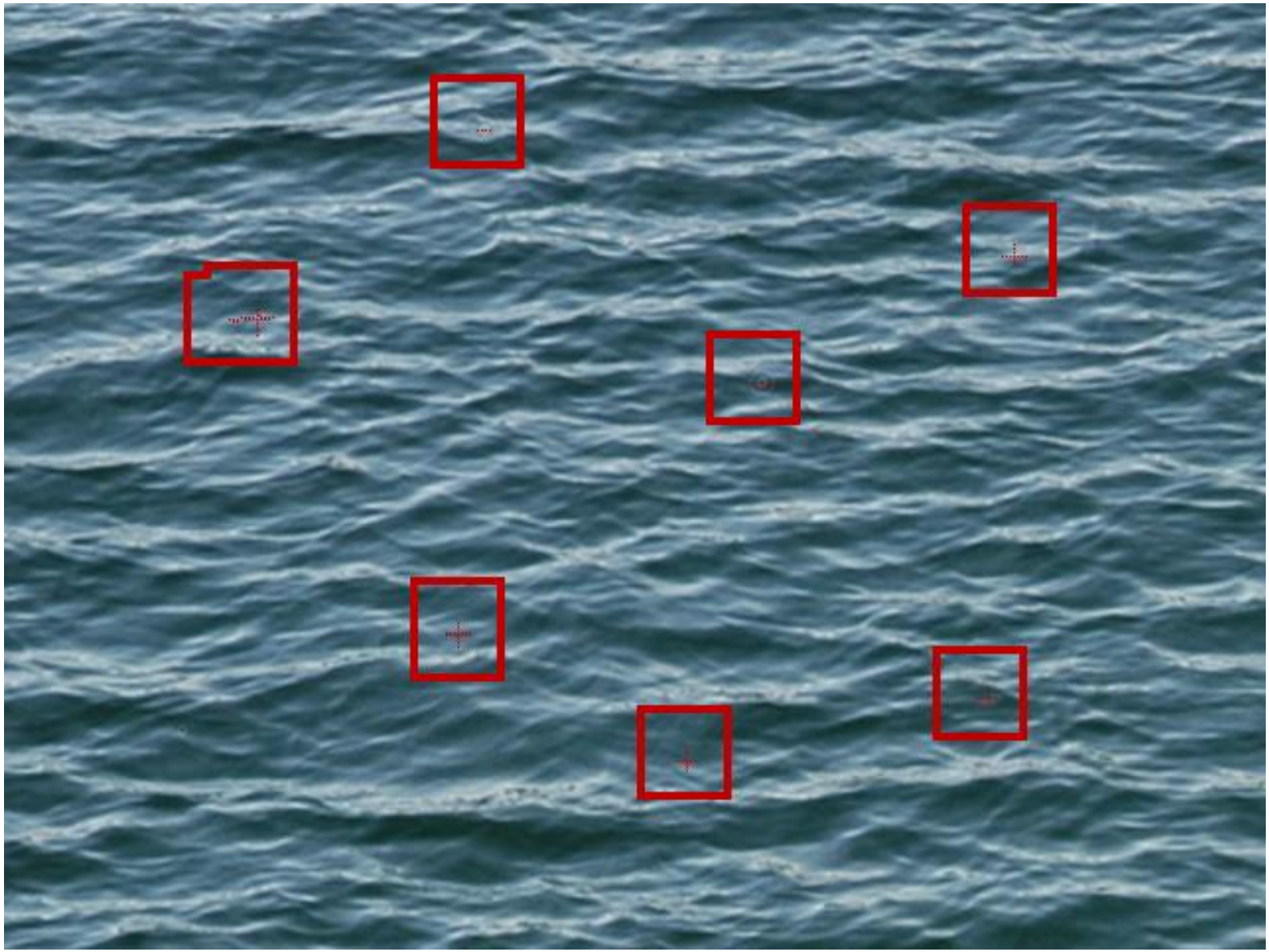

Figure 4. Output "Chips"