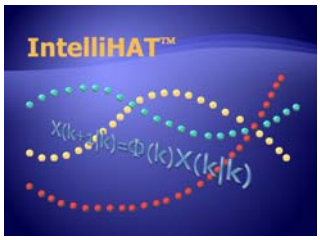


IntelliHAT™

Vitech Research

IntelliHAT™ (**Intelli**gent **H**ydro-**A**coustics **T**racker) is a self-contained software package designed to track individual moving targets recorded by Hi-resolution sonar, such as DIDSON™ (Sound Metrics Corp), as well as split-beam sonar. This leading edge software combines radar tracking algorithms with powerful pattern recognition techniques and image processing algorithms, and is aimed at tracking targets at high densities in a clutter background.

Typical Applications:

- Automatic counting of moving targets, such as migrating salmon.
- Analysis of fish behavior.
- Measurement of fish size for species composition estimation.

Main Features:

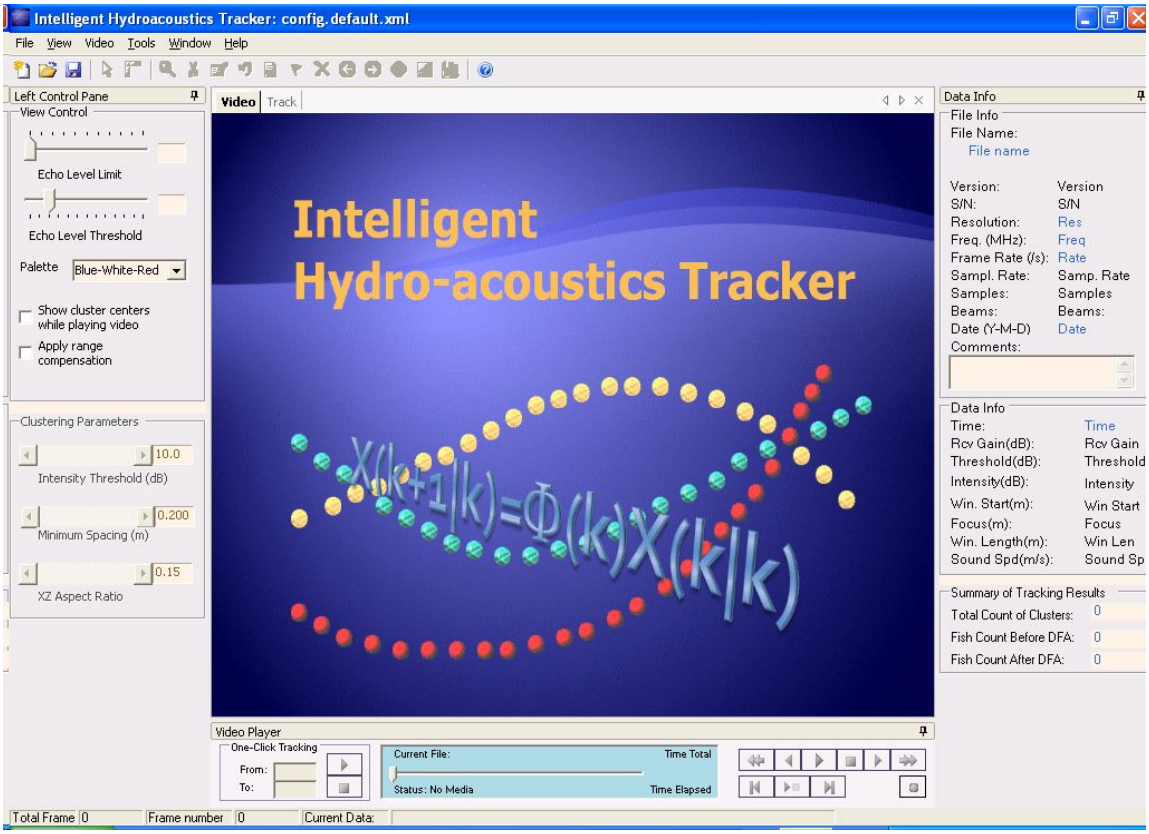
- Target extraction from images via pattern recognition algorithms. This component is for processing sonar image data such as generated by DIDSON sonar.
- Multiple target tracking. This component takes data provided by the target extraction component and generates track data that can be further analyzed to provide needed information. It also accepts split-beam data such as generated by HTI split-beam sonar. Standard radar target tracking algorithms are used.
- Pattern recognition filtering. This component examines track data and filters out any tracks deemed as unwanted, by using a DFA (Discriminant Function Analysis) algorithm.
- Track editing. This is a graphical tool that allows users to inspect tracks visually and compare with their corresponding video clips (if available). Users can decide whether the tracks under inspection are valid based on their judgment, and delete them if the tracks are considered invalid. This allows the user to have full control of the final tracking results.

- Report generator. This generates statistics from filtered and/or edited track data. Key statistics include target count and velocity.
- A toolbox for various optimization and training tasks. These include a DFA trainer and an alpha-beta filter trainer for multiple target tracking.
- Target size measurement. This component allows users to measure target size on an image such as generated by DIDSON sonar, via a computer mouse. It can also automatically generate size measurements for a set of targets selected either manually or automatically by the software.

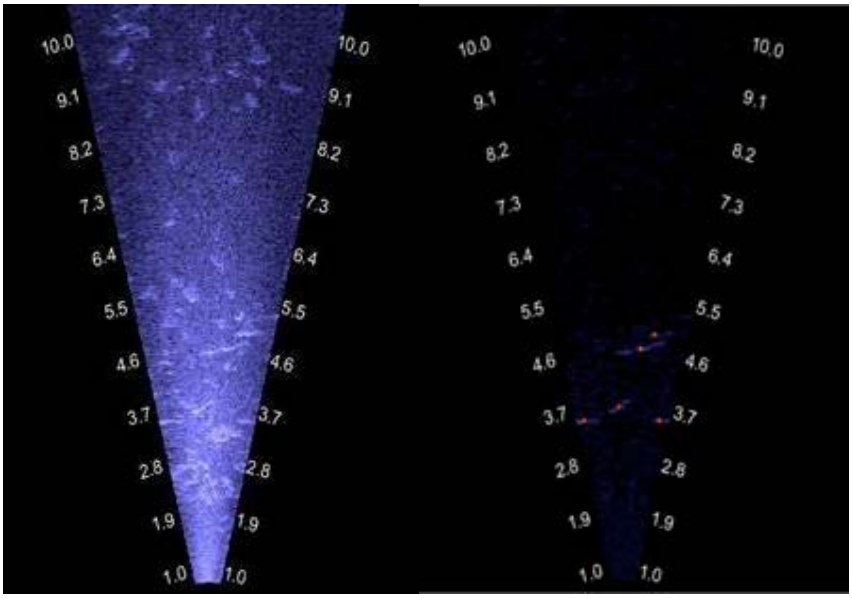
About Vitech Research

Vitech Research (Vitech Innovative Research and Consulting) offers contract research and software system development services to scientific communities and industries. Vitech Research has expertise in a broad range of areas such as underwater acoustics, digital signal and image processing, statistical data analysis, and scientific computing. The company also conducts research and development of innovative and emerging technologies, with a goal of converting these technologies into industrial products. One key area of the research is application of fisheries sonar in riverine and oceanic environments that meets specific needs of world-wide user groups. For more information, please visit our website vitech.apexlink.ca, or email to vitech@apexlink.ca

IntelliHAT™

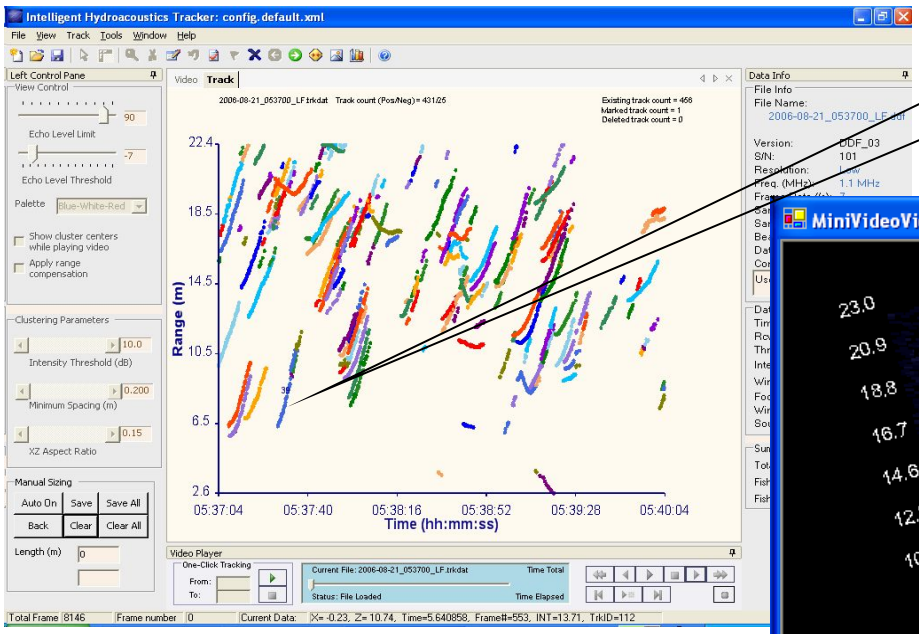


Interface of the software



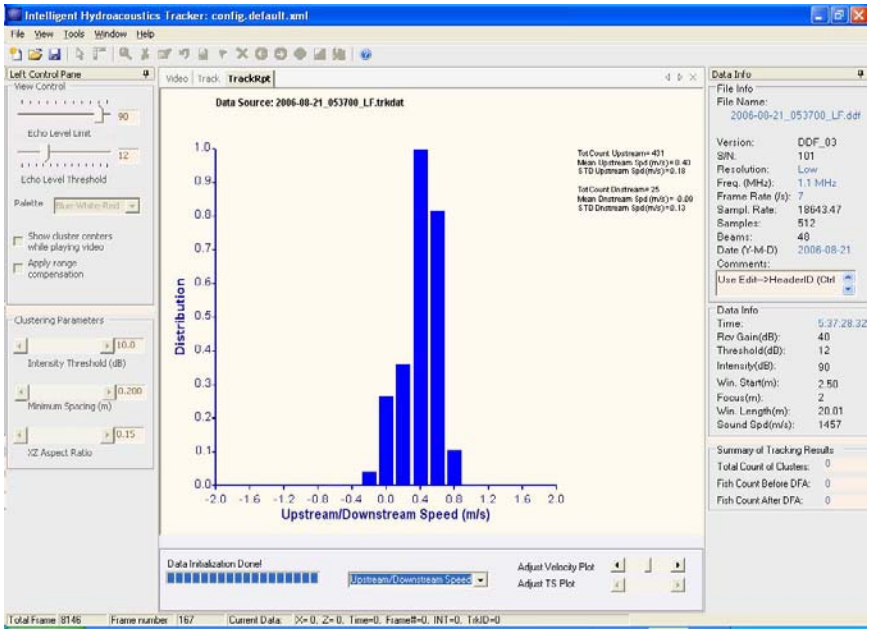
Targets on a video image (left) are identified via a pattern recognition technique. The red dots (right) show the centers of identified targets. The image has been preprocessed before target identification.

IntelliHAT™



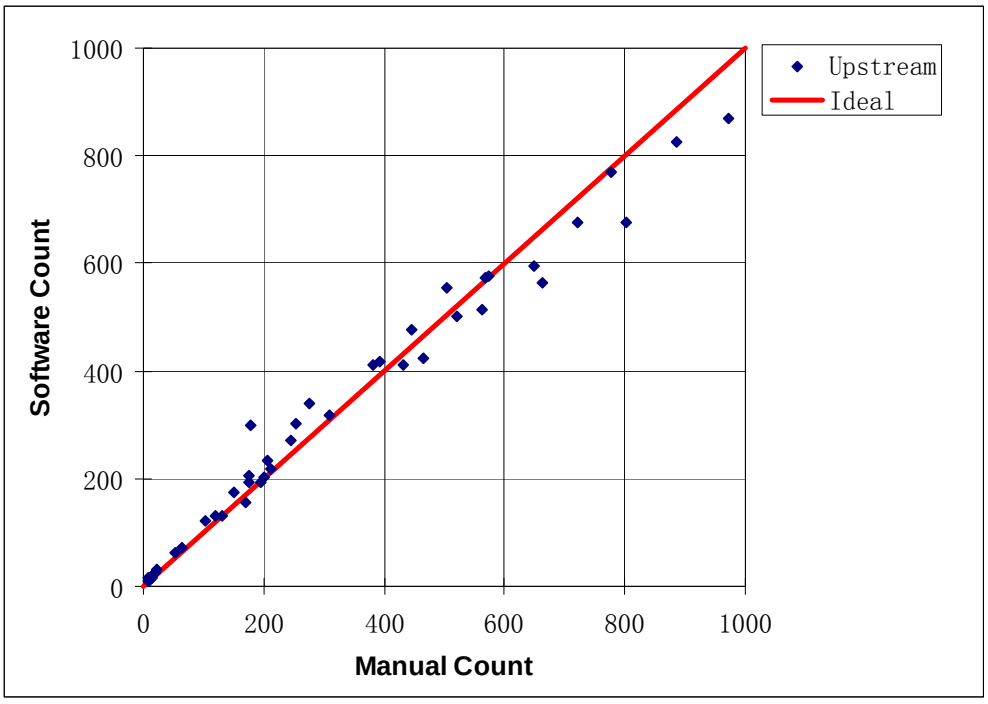
One mouse click allows the user to view a selected target in video

Targets on sonar images such as produced by DIDSON are tracked over time. This figure shows individual tracks with range versus time.

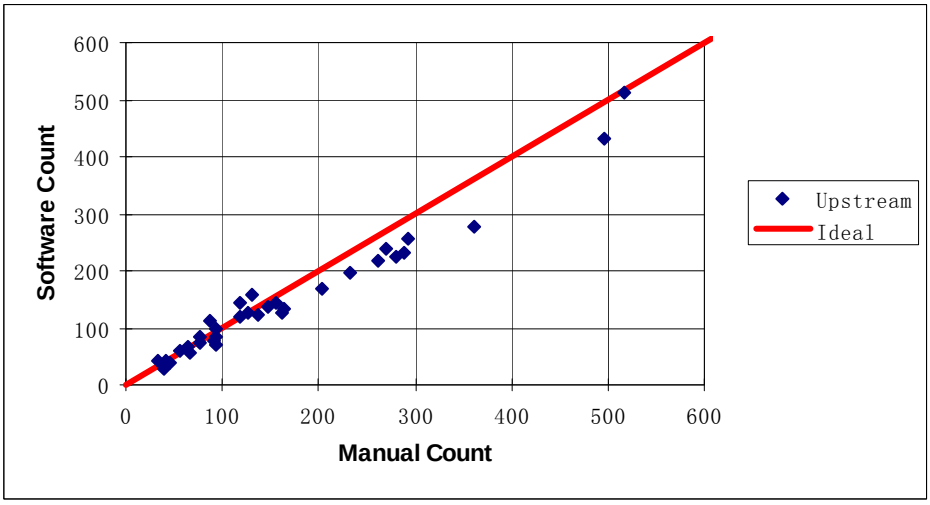


Track data can be used to calculate the statistics of the tracked targets, such as velocity. This figure shows a histogram of velocity in the upstream/downstream direction.

IntelliHAT™



This plot shows a comparison of fish counts produced by the software, and the corresponding manual counts obtained by visually identifying targets on DIDSON images. The red line represents the case where the software counts and manual counts are identical. The DIDSON data and manual counts were collected at Chilko River, BC, Canada (Courtesy of DFO, BC Interior in Kamloops).



This plot shows another example for comparison of software counts and manual counts. The DIDSON data and manual counts were collected at Fraser River, BC. Canada (Courtesy of the Pacific Salmon Commission).