CUVILib - GPU Accelerated Vision & Imaging

Overview

Image Processing algorithms are used in a variety of different domains, from surveillance to medicine to industry. CUVI (CUDA Vision and Imaging Library) provides GPU accelerated Vision and Imaging functionality with plug-and-play ease of use, simple yet powerful interface and support for both NVIDIA and AMD GPUs. With over 1000 users of the Beta version, CUVI has fast grown into a mature solution of choice when it comes to delivering real-time performance for your Imaging/Vision applications and software-frameworks.

Plug-and-play acceleration

CUVI's Imaging/Vision functionalities are 10 times or more faster then state-of-the-art CPU based commercial Imaging/Vision libraries.

Simplicity

CUVI abstracts all the low level GPU implementation details from the user so what you get is a simple API with extensive documentation to get you started within 10 minutes! Users do not require any prior GPU programming knowledge to use CUVI.

Cross OS, Cross Platform

Supports 5 Operating Systems and 2 major GPU vendors
Windows, Mac OS, Linux, Android (soon) and iOS (soon)
NVIDIA CUDA GPUs and AMD GPUs

Advanced wrappers

CUVI will not invalidate your investment in other imaging libraries. Advanced wrappers are available for popular imaging software libraries like OpenCV.

Functionality

CUVI offers advanced imaging functionality divided into the following modules:

1. Feature Extractors

CUVI offers a rich set of feature extraction algorithms. CUVI's feature detectors conform with their respective standards and gives comparable results to other 3rd party imaging libraries by delivering magnitudes faster performance.

KLT | Harris | SURF | Hough Circle | Hough Line

2. Motion detection & tracking

CUVI offers motion detection functionality for detecting apparent motion of objects, surfaces and edges in a video with several Pyramid and non-pyramid based Optical Flow algorithms which perform painfully slow on CPUs but delightfully fast on GPUs using CUVI.

Optical Flow LK | Optical Flow HS | Optical flow LK Pyramid | Optical Flow Farneback

3. Image filtering

CUVI provides a single global filter function which applies any linear filter to an image. Currently we support mask sizes of 3x3, 5x5 and 7x7. There are numerous commonly used and famous filter masks already available in CUVI.

2D Linear Filter | Smoothing | Sharpening | Sobel Edge detector | Gaussian Filter | And more...

4. Image Transforms

CUVI offers a range of Image Tranformation functions which range from simple arithmetic operations on images to complex mathematical operations which converts images from one representation to another.

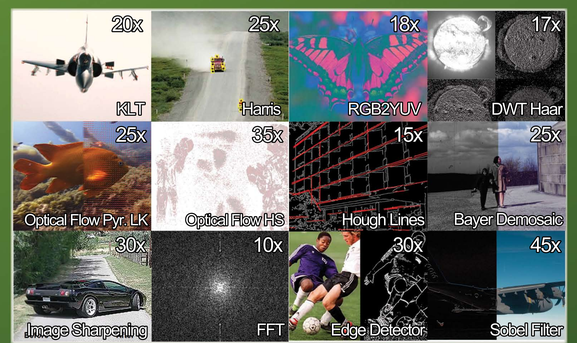
DWT Haar | Hough | FFT | DCT | Image Warping | And more...

5. Color Operation

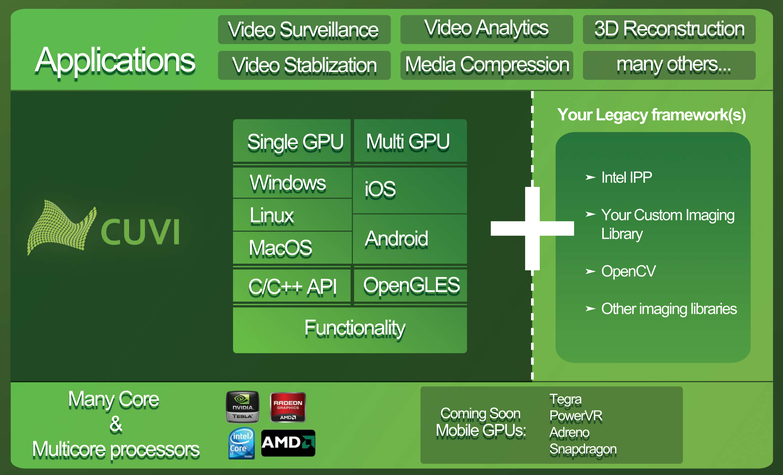
CUVI has a rich set of color opeartion functionality which supports 3-channel RGB/YUV/YCbCr, 4-channel RGBA and 1-Channel intensity images and range from color conversions to color correction, LUT and Bayer Demosaicing.

Bayer Demosaicing | RGB2YUV | YUV422To444 | Channel mixing | LUT | RGB2YCbCr | And more...

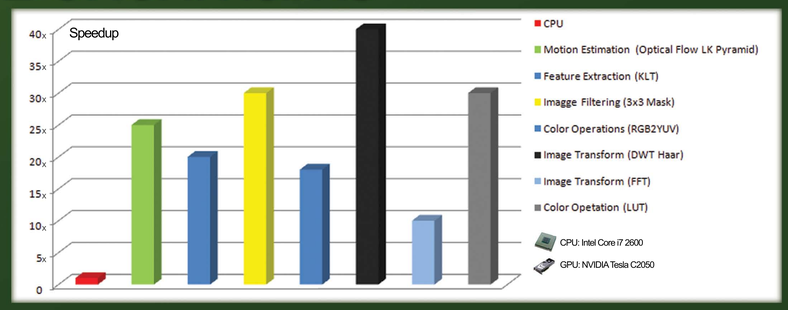
Sample Images



Architecture

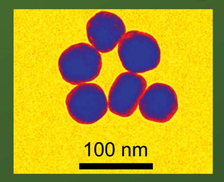


Benchmarks



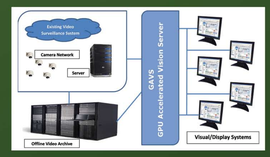
Examples

Electron Tomography



CUVI has been successfully tested in the Electron Tomography domain. TunaCode supplied software has successfully been integrated into a leading ET company's image processing software suite. CUVI's GPU accelerated modules add value by providing significant performance advantage over similar CPU based solutions. The developed functionality of 3D reconstruction, detection and tracking of key features in images have wide applicability, including applications in Nano Electronics, Nano Research and Life Sciences.

Video Surveillance

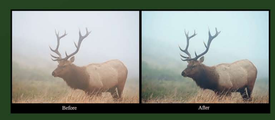


Manual monitoring of multiple video streams is not feasible when securing vital assets and facilities with zero tolerance for error. Automated motion and intrusion detection makes sure that the user defined areas-of-interest are monitored at all the times. Suspicious movement detected in video stream from any of the cameras connected to the system generates alarms on the Overall Situational Display (OSD) and brings the corresponding video stream to operator's attention, thereby, greatly improving his situational awareness. The OSD graphical user display can easily be configured for any camera deployment scenario. CUVI finds it's use case here by significantly bringing down the deployment cost and computation resource requirement while ensuring real-time performance.

Broadcast Media Monitoring

Digital Video archives e.g. recorded surveillance video or public broadcast video are frequently searched for required information. This is, generally, an offline activity with no real time constraints. However, the shear size of data to be processed presents a computational challenge. CUVI offers the functionality to process single and multialso ple channel video clip and critical frame searches at blindingly high speeds.

Video Enhancement



Hundreds of thousands of videos are recorded and uploaded every day on Youtube, Vimeo, Facebook etc. Most of these are shot by amateurs and often need some level of post-processing to make them pleasent. CUVI provides functionality to deblur, recolor, stabalize and a host of other functionality without the need of expensive hardware and at blazing fast speeds. CUVI has already been integrated into a popular film-editing software.

Contact

CUVI is developed and licensed by TunaCode which delivers accelerated computing solutions. Our innovative use of many-core and multi-core processors combined with years of software implementation experience enables us to deliver customized Imaging solutions to Security, Medical, Entertainment and Corporate domain applications. We also offer GPU consulting services. Contact us today to discuss your requirements.

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TunaCode
Software for Personal Supercomputers