MONDAY, OCTOBER 14, 2019

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FLIR Neuro Technology: Automate Complex Decisions Faster with Deep Learning

Using deep learning methods, developers can quickly automate complex and subjective decision making. The result is the ability to develop systems faster, deliver higher quality products, and enhance productivity.

Normally, deep learning systems require separate cameras and computer systems. Often the images captured for analysis must be sent to a host or cloud system where the neural network provides an inference driven decision. This is often not ideal, relying on remote or cloud-based processing increases latency and introduces reliability and security risks.

FLIR Neuro Technology eliminates these risks and simplifies system infrastructure by allowing you to **deploy your trained neural network directly to the camera.** This reduces system cost and complexity by enabling decisions to be made directly on-camera, in many cases without a host PC. Inference driven decisions occurring on the camera, also called "on the edge", eliminate system latency and potential security risks. In the case of the FLIR Firefly DL camera, both the image capture and the inference decision is made with a system with a 27 mm x 14.5 mm footprint.



Open Platform for Ultimate Flexibility

- To provide maximum flexibility, Neuro supports popular open source frameworks including TensorFlow and Caffe.
- For easy deployment, FLIR's NeuroUtility conversion tool for new and experienced deep learning developers helps to deploy classification, detection and localization networks to your Neuro supported cameras – quickly and easily.

Key Deep Learning Functions

Neuro is ideal for the inference functions of object classification, detection and localization such as:

CLASSIFICATION	
Driver/Pilot monitoring	Detecting wakefulness of driver or pilot
Production inspection	Classification and sorting of products
Fail-safe for biomedical - general	Identification of specific abnormalities in tissues in biopsy samples
Missing parts detection	Detecting if any parts which should be included in a box are missing
Face recognition - automation	Recognition of faces for building automation
Face recognition - security	Recognition of faces for security
Solar panel inspection	Differentiation between cosmetic scratches and critical cracks
Packaging inspection	Inspection of printed packaging
Sign language reading	matching sign language to words
Discrete part inspection	Inspecting individual parts
Pet detection	Identifying pets to control food dispensing/pet doors
PCB inspection	Identifying defects in specific locations PCB
DETECTION AND LOCALIZATION	
Textile inspection	Detection of defects in textiles
Fail-safe for biomedical - specific defect	Identification of abnormal tissue in biopsy samples

Semiconductor wafer inspection - general	Inspection of silicon wafers comparing against known good parts
Collision avoidance for UAS	Detection of potential collision hazards for drones
Point of sale systems	Identification of products on check-out conveyor belt
Detecting out of stock items	Identifying products which are out of stock on a shelf
Blister-pack inspection	Inspection of packaging for pharmaceutical products
Semiconductor wafer inspection - specific defect	Looking for specific class of defects on a silicon wafer
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Weed detection	Coordinates passed to weed killing
License plate detection	Recognition of printed licence plates
Killbot	Guidance for robots which identify and eradicate invasive species
Sea lice detection and tracking	Detection and tracking of sea lice on farmed fish
Demographic profiling	Estimating age and gender of people in a scene for retail analytics
Safety system for mobile robots	Detect people and avoid running them over
Soldering inspection	Inspection of solder joint quality

Functionality to Make Deep Learning Development Easier

- Neuro provides automatic image resizing. Images passed in from the camera are sized to match your neural network parameters
- Neuro provides instant result validation. You can iterate quickly by uploading test images and instantly validate inference results; eliminate the need for a separate test environment. This is achieved with image injection whereby test images bypass the core camera functions and are sent directly to the neural network for validation.

FLIR Cameras Supported By Neuro

FLIR Firefly DL camera



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