

## Deep Learning for Industrial Inspection

In this workshop, you'll learn how to train, accelerate, and optimize a defect detection classifier. We'll start by exploring the key challenges around industrial inspection, problem formulation, and data curation, exploration, and formatting. Then, you'll learn about the fundamentals of transfer learning, online augmentation, modeling, and fine-tuning. By the end of the workshop, you'll be familiar with the key concepts of optimized inference, performance assessment, and interpretation of deep learning models.

<b>Duration:</b>	8 hours
<b>Price:</b>	\$10,000 for groups of up to 20 (price increase for larger groups). During the workshop, each participant will have dedicated access to a fully configured, GPU-accelerated workstation in the cloud.
<b>Assessment type:</b>	Code-based
<b>Certificate:</b>	Upon successful completion of the assessment, participants will receive an NVIDIA DLI certificate to recognize their subject matter competency and support professional career growth.
<b>Prerequisites:</b>	Experience with Python and convolutional neural networks (CNNs)
<b>Languages:</b>	English, Taiwanese
<b>Tools, libraries, and frameworks:</b>	TensorFlow, NVIDIA TensorRT™, Keras

### Learning Objectives

At the conclusion of the workshop, you'll learn how to:

- > Formulate an industrial inspection case study and curate datasets generated by automated optical inspection (AOI) machines
- > Deal with the logistics and challenges of data handling in an industrial inspection workflow
- > Extract meaningful insights from our dataset using Pandas DataFrame and NumPy library
- > Apply transfer learning to a deep learning classification model (Inception v3)
- > Fine-tune the deep learning model and set up evaluation metrics
- > Optimize the trained Inception v3 model on an NVIDIA V100 GPU using TensorRT 5
- > Experiment with FP16 half-precision fast inferencing with the V100's Tensor Cores

### Why Deep Learning Institute Hands-On Training?

- > Learn to build deep learning and accelerated computing applications for industries such as autonomous vehicles, finance, game development, healthcare, robotics, and more.
- > Obtain hands-on experience with the most widely used, industry-standard software, tools, and frameworks.
- > Gain real-world expertise through content designed in collaboration with industry leaders such as the Children's Hospital of Los Angeles, Mayo Clinic, and PwC.
- > Earn an NVIDIA DLI certificate to demonstrate your subject matter competency and support career growth.
- > Access content anywhere, anytime with a fully configured, GPU-accelerated workstation in the cloud.

## Workshop Outline

TOPIC	DESCRIPTION
<b>Introduction</b> (15 mins)	<ul style="list-style-type: none"> <li>&gt; Meet the instructor.</li> <li>&gt; Create an account at <a href="https://courses.nvidia.com/join">courses.nvidia.com/join</a></li> </ul>
<b>Understanding Key Concepts</b> (120 mins)	<ul style="list-style-type: none"> <li>&gt; Learn about the key concepts of visual inspection.</li> <li>&gt; Understand the problem formulation and data curation.</li> </ul>
<b>Break</b> (60 mins)	
<b>Transfer Learning and Modeling</b> (120 mins)	<ul style="list-style-type: none"> <li>&gt; Learn how to train and verify deep learning models, based on transfer learning procedure.</li> <li>&gt; Get hands-one experience with online augmentation while training, to save disk storage of datasets.</li> <li>&gt; Take a deeper dive into the nuances of fine-tuning your model.</li> </ul>
<b>Break</b> (15 mins)	
<b>Understanding Inference and Interpreting Your Results</b> (120 mins)	<ul style="list-style-type: none"> <li>&gt; Focus on production deployment and optimization.</li> <li>&gt; Learn how to freeze the trained deep learning model and optimize it using TensorRT.</li> <li>&gt; Compare the performance of the optimized model against the original TensorFlow-GPU model and measure the improvement.</li> </ul>
<b>Final Review</b> (15 mins)	<ul style="list-style-type: none"> <li>&gt; Review key learnings and wrap up questions.</li> <li>&gt; Complete the assessment to earn a certificate.</li> <li>&gt; Take the workshop survey.</li> </ul>