Applications of AI for Anomaly Detection

Whether your organization needs to monitor cybersecurity threats, fraudulent financial transactions, product defects, or equipment health, artificial intelligence (AI) can help catch data abnormalities before they impact your business. AI models can be trained and deployed to automatically analyze datasets, define "normal behavior," and identify breaches in patterns quickly and effectively. These models can then be used to predict future anomalies. With massive amounts of data available across industries and subtle distinctions between normal and abnormal patterns, it's critical that organizations use AI to detect anomalies that pose a threat.

In this Deep Learning Institute (DLI) workshop, developers will learn how to implement multiple AI-based approaches to solve a specific use case: identifying network intrusions for telecommunications. They'll learn three different anomaly detection techniques using GPU-accelerated XGBoost, deep learning-based autoencoders, and generative adversarial networks (GANs) and then implement and compare supervised and unsupervised learning techniques. At the end of the workshop, developers will be able to use AI to detect anomalies in their work across telecommunications, cybersecurity, finance, manufacturing, and other key industries.

All workshop attendees get access to fully configured, GPU-accelerated servers in the cloud, guidance from a DLI-certified instructor, and the opportunity to network with other developers, data scientists, and researchers attending the workshop. Attendees can earn a certificate to prove subject matter competency and support professional growth.

Prerequisites:	Professional data science experience using Python; experience training deep neural networks.
	To gain experience training deep neural networks, we suggest DLI's Fundamentals of Deep Learning for Computer Vision course.
	To gain experience with data science using Python, we suggest Kaggle's Intro to Machine Learning course.
Technologies:	NVIDIA RAPIDS™, XGBoost, TensorFlow, Keras, pandas, autoencoders, GANs, machine learning, artificial intelligence
Price:	$10,000 for each group of 20 participants (excludes tax, if applicable)
Duration:	Approximately 8 hours

Learning Objectives

In this workshop, developers will learn how to:
> Prepare data and build, train, and evaluate models using XGBoost, autoencoders, and GANs
> Detect anomalies in datasets with both labeled and unlabeled data
> Classify anomalies into multiple categories regardless of whether the original data was labeled

Why DLI Hands-On Training?

> Build deep learning, accelerated computing, and accelerated data science applications for industries such as autonomous vehicles, healthcare, manufacturing, media and entertainment, robotics, smart cities, and more.
> Gain real-world expertise through content designed in collaboration with industry leaders, such as the Children's Hospital of Los Angeles, Mayo Clinic, PwC, and Uber.
> Access content anywhere, anytime with a fully configured, GPU-accelerated server in the cloud.
> Earn an NVIDIA DLI certificate to demonstrate subject matter competency and support career growth.
> Work with the most widely used, industry-standard software, tools, and frameworks.

Workshop Outline

Introduction (15 mins)	
Anomaly Detection in Network Data Using GPU-Accelerated XGBoost (120 mins)	**Learn how to detect anomalies using supervised learning.** > Prepare data for GPU acceleration using the provided dataset. > Train a binary and multi-class classifier using the popular machine learning algorithm XGBoost. > Assess and improve your model's performance before deployment.
Lunch (60 mins)	
Anomaly Detection in Network Data Using GPU-Accelerated Autoencoders (120 mins)	**Learn how to detect anomalies using modern unsupervised learning.** > Build and train a deep learning-based autoencoder to work with unlabeled data. > Apply techniques to separate anomalies into multiple classes. > Explore other applications of GPU-accelerated autoencoders.
Break (15 mins)	
Project: Anomaly Detection in Network Data using GANs (120 mins)	**Learn how to detect anomalies using GANs.** > Train an unsupervised learning model to create new data. > Use that new data to turn the problem into a supervised learning problem. > Compare the performance of this new approach to more established approaches.
Assessment and Q&A (15 mins)	

Next Steps

Connect with your NVIDIA contact to schedule an onsite workshop for your team, or submit your request at www.nvidia.com/requestdli and the DLI team will be in touch.

Related Training

For organizations in the manufacturing industry, we recommend the instructor-led workshop Applications of AI for Predictive Maintenance. Your team will explore how to use AI to predict the condition of equipment and estimate when maintenance should be performed.

Additional Resources

DLI offers other hands-on training and educational resources in deep learning, accelerated computing, and accelerated data science, including:

> Self-paced, online courses on deep learning, accelerated computing, accelerated data science, and more at www.nvidia.com/dli

> Instructor-led workshops on deep learning for computer vision, multi-GPUs, healthcare, industrial inspection, robotics, smart cities, and more at www.nvidia.com/dli

> Blogs, webinars, and other resources on AI at www.nvidia.com/ai