**Docket #:** S19-208

# Improved Anomaly Detection Using Adversarially Learned Inference

Researchers at Stanford have developed a potentially best-in-class anomaly detection method with a wide range of applications. Anomaly detection is the identi?cation of abnormal events, items or data, and is used in many ?elds such as fraud detection, medical diagnosis and network intrusion detection. Existing methods focus on modelling the distribution of normal data provided during training. However, this does not necessarily ensure the correct detection of anomalous data (false positive). The researchers propose a new Generative Adversarial Network with anomaly augmentation (GANAA) in which deep neural networks are adversarially trained to better recognize samples from an anomaly distribution. This approach is based on a new de?nition of the loss function and novel use of discriminator networks.

**Figure**

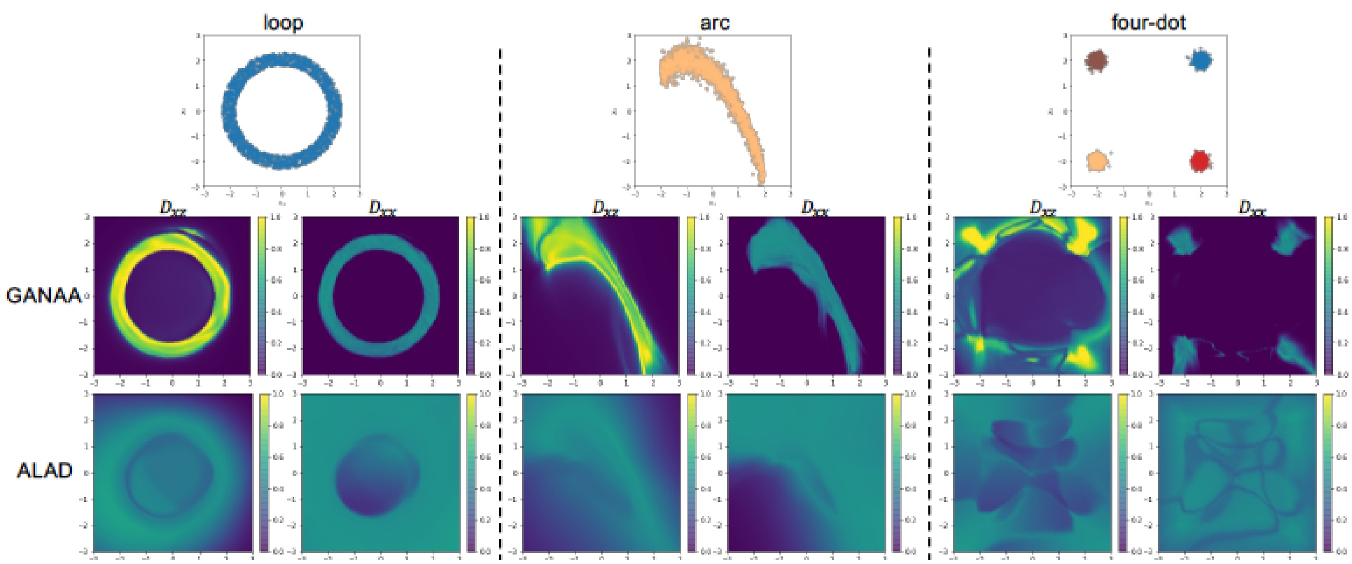


**Figure description:**

Results on three synthetic datasets: "loop," "arc" and "four-dot." The ?rst row shows samples of normal data. The second and third row show the output probability of discriminators in GANAA and another method called ALAD, respectively. (ALAD is Adversarially Learned Anomaly Detection). These plots show the clear distinction between normal and abnormal sets with GANAA. ALAD's prediction is much fuzzier.

**Stage of Development**
Mathematical proofs show that this approach has stronger guarantees for detecting anomalous examples compared to the current state of the art. Experimental results on both real-world and synthetic data show that the new model leads to signi?cant and consistent improvements on previous anomaly detection benchmarks. This includes significant advantages over state-of-the-art anomaly detection using three data sets (network intrusion, arrhythmia, and thyroid).

## Applications

- Anomaly detection
- Cyber security, intrusion detection, surveillance, manufacturing, factory assembly line, quality control, medical diagnostics, chemical and physical processes control, audits and monitoring

## Advantages

- Significantly improves ability to differentiate between normal and abnormal data and reduce false positives
- Shown to outperform current state of the art anomaly detection methods

## Patents

- Published Application: 20200410285
- Issued: 12,165,067 (USA)

## Innovators

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# Licensing Contact


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