# 04 Fast inference of accurate anomaly detectors

Transfer anomaly detection for unseen datasets

Abstract

We propose a method to improve the anomaly detection performance on target datasets by transferring knowledge on related datasets. Although anomaly labels are valuable to learn anomaly detectors, they are difficult to obtain due to their rarity. To alleviate this problem, we use anomalous and normal instances in the related datasets as well as target normal instances. Our method can infer the anomaly detectors for target datasets without re-training by introducing a novel permutation-invariant neural network. This neural network takes the set of normal instances as an input and infers the dataset-specific anomaly detector from the set. By learning with multiple related datasets, our neural network can learn the latent relationship between the anomaly detector for each dataset and the set of normal instances in the dataset. When target normal instances can be used during training, our method can also use them for training in a unified framework.
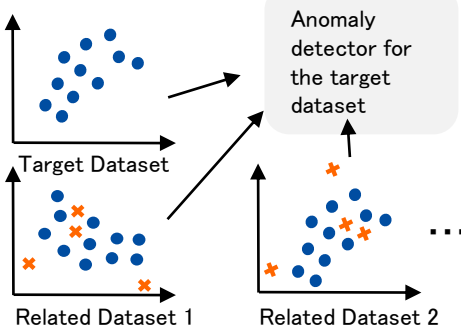
What's is Anomaly Detection?

A task to detect anomalous instances in a dataset.
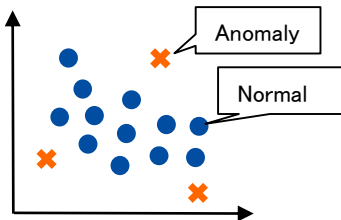
- We can detect anomalies accurately by using normal/anomalous data.
- However, it is difficult to collect anomalies due to their rarity.

Approach

We use anomalous/normal instances in "related" datasets as well as normal ones in the target dataset.

Proposed Method

- We propose a neural network (NN) that infers an appropriate anomaly detector from the set of normal instances.
- We pre-trains this neural network with multiple related datasets.
  ⇒ It can infer the accurate anomaly detector from normal instances in the target dataset without re-trainig.

We can infer accurate anomaly detector (decision boundary) without anomalies in the target dataset.
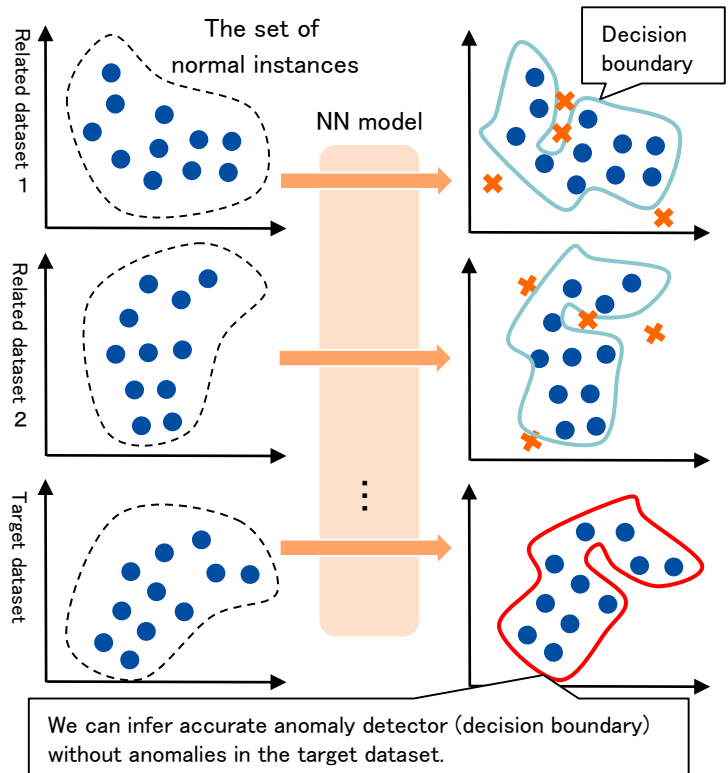
References

[1] A. Kumagai, T. Iwata, Y.Fujiwara, "Transfer anomaly detection by inferring latent domain representations," *Proc. 33rd Conference on Neural Information Processing Systems（NeurIPS）*, 2019.

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