

STATE-OF-THE-ART ANOMALY DETECTION

Context

Being able to signal rare events in data is important to quickly react to it. For example, early failures during production processes, spotting medical issues in patients or detect counterfeit bills.

There are several main challenges for anomaly detection. First of all, it is difficult to obtain large quantities of the anomalous data therefore leading to class imbalance. Second, there can be many different anomalies with completely different behavior. Sometimes, the behavior is even unknown until an abnormal event occurred. Finally, there are different types of anomalies; some are single outliers where in other cases a pattern is abnormal. The latter making it a more complex problem.

Different type of models have been developed to try and detect anomalies. For example, features can be learned from the observed data and based on these features some anomaly scoring measure is applied. Alternatively, encoderdecoder networks are used to reconstruct the normal data. The idea is then that the reconstructions for abnormal data will deviate. Some methods will work better for specific cases or data types. This field is continuously improving and thus it is important to keep up to date.

Internship overview

- Master Student
- Internship / Graduation
- Mathware
- Location: Eindhoven

Technologies

- Deep Learning
- Anomaly detection



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Assignment

Investigate recent developments in anomaly detection to find the state-of-the-art models for different problems such as:

- Interpretable anomaly detection where the goal is not to only find the anomalies, but also get insight in why the anomaly is detected
- Different kind of anomalies: point, conditional or grouped.
- Weakly supervised anomaly detection that combines the limited abnormal data with the normal data for training
- Non-IID anomaly detection can be investigated where abnormal features are interdependent

Implement and test some of the deep learning models to gain experience with them. Also work with different data types such as image, video, sequence or tabular data

Activities

The goal is to learn and explore several state-of-the-art models for anomaly detection.

First, the literature study should be done to get an overview of the latest models and developments.

Next, some of the most interesting or promising models should be implemented and applied to use cases.

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Would you like to know more about this student assignment?

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