Chapter 15
Anomaly Detection Using Deep Learning With Modular Networks

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ABSTRACT

In daily realistic activities, security is one of the main criteria among the different machines like IOT devices, networks. In these systems, anomaly detection is one of the issues. Anomaly detection based on user behavior is very essential to secure the machines from the unauthorized activities by anomaly user. Techniques used for an anomaly detection is to learn the daily realistic activities of the user, and later it proactively detects the anomalous situation and unusual activities. In the IOT-related systems, the detection of such anomalous situations can be fine-tuned with minor and major erroneous conditions to the machine learning algorithms that learn the activities of a user. In this chapter, neural networks, with multiple hidden layers to detect the different situation by creating an environment with random anomalous activities to the machine, are proposed. Using deep learning for anomaly detection would help in enhancing the accuracy and speed.

INTRODUCTION

In a Daily realistic activity so many unusual intrusions and abnormal activities has occurred at different situation. This may cause the problem while doing an important activity in day to day life like card transaction, Healthcare etc. The detection of Anomalies is very important because it may cause the problem for the activity and which may lead the activity in to different directions so the end user may not get the

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positive result. Anomaly detection is one which can be used to identify the abnormal behavior and which do not show the expected behavior. So to detect the anomalies we further move into the Neural Networks which is efficient method by training the model by doing continuous different erroneous conditions to the network. The Neural network finally observes the learning features and we can match into the target output and actual output.

To do this initially the Dataset is very important because to train the model it is very important and from the dataset we can test in different conditions. Once the model is trained, then for Different abnormal activities the Training model that is Neural network able to find out the anomalies when different situations, video, audio etc. shown to the model. By using the neural network, we can we can find out the anomalies. Deep Learning is other one main basement in this work which efficiently learns the Features. Deep Learning is one in which is the part of the Artificial intelligence in which is capable of learning the unsupervised from the data which is not structured format that is unstructured data.

Key Issues in Deep Learning and Anomaly Detection

Deep Learning is one of the essences in the artificial intelligence. Now days the use of deep learning is wide and vast in so many fields. Along with that Anomaly detection is also an integrated part of the deep Learning. The Experimental analysis in these fields may results either the positive or negative. So to eradicate the features it's very important to make some important steps to reach the milestones in Deep Learning and Anomaly Detection. Some of the Key Issues listed below about the Deep learning and Anomaly Detection.

1. Understanding the methodology like how to choose the features which is Structural which is far being from reality.
2. How to Tune efficiently the hyper-parameter Model is one of the major cause in the field of the deep learning.
3. The Computational efficiency is another key issue in the field of Deep learning.
4. Still the Computational Efficiency leads performance on the Datasets which is large and in offline environment also.
5. Constant Memory and Time Complexity is the major serious challenge.
6. The Changes in the Data which is non-interesting and erratic metrics.
7. The Training Data which is in the format of Dirty and abundant of ground truth.

The above are the some of the major issues in the field of Deep learning and Anomaly detection.

Motivational Factors

In 21st century the technological insights playing a Major role. In this era machines are capable of learning the features and it is automated for every action and gives back the reactions. From Man to Machine there have been lot changes occurred in this technological decade. Neural network in the human being is the core heart of every action and reaction. Like the human being react and thinking capacity is also integrated to the Machines. Now the era comes, in which Machines learns the features like a Man and react as per the trained feature and which look like a human brain. Here The Deep Learning learns the integrated features in the multiple levels. Learning the multiple level distributions, training data, mul-