by density ratio estimation and confirmed whether it could detect SynFlooding attack and DNS tunneling attack through experiments for actual communication. As a result, we confirmed the characteristics of graphical lasso and density ratio estimation and also detected the problem of network anomaly detection by detecting changes in the time-series correlation. Graphical lasso and density ratio estimation, which are algorithms used in the proposed method, can detect changes in correlation among variables in multiple variables, so it can confirm whether changes in multiple variables are detected. In that case, it is thought that it becomes an issue to examine which value is adopted as an abnormal value. Since it is necessary to consider which value of the anomaly score is considered as an anomaly, we confirmed in this paper whether it could be detected by visualizing it in a graph, but from the viewpoint of automatic detection, we think that it is necessary to set a threshold and to issue an alert by probability statistics.

Moreover, correlation change detection can be used to extract the relationship between numbers, and it is considered to be one of the many network anomaly detections in many network security by understanding whether the relationship between variables is broken.

9. References

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10. Acknowledgements

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