CSE449

Fall 2023

Task 2

Section: 01

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Paper Name: Anomaly Detection using Autoencoders in High Performance Computing Systems

1. Summary

1.1 Motivation/Purpose/Aims/Hypothesis (10%)

The paper proposes an approach to detect anomalies in High Performance Computing (HPC) systems. It seeks to find the distinction between normal and anomalous system states, emphasizing the importance of early detection to mitigate further issues. The motivation arises from the need for a more sophisticated and reliable system to detect anomalies, ensuring the smooth running of HPC systems.

1.2 Contribution

The authors have introduced a methodology for anomaly detection that relies on the comparison of the actual values and the expected ones, based on their historical data. This approach is grounded in leveraging the reconstruction error trends to discern anomalies.

1.3 Methodology

A key component of their methodology involves reconstruction error-based detection, where any anomaly detection method hinges upon the hypothesis that an anomalous feature can elicit a trend in the corresponding anomaly detection method's output. The paper presents experiments conducted with real HPC system data. The use of the DAVIDE system as a test-bed is noted, and various tests, including those for node davide/5, are highlighted.

1.4 Conclusion

The research concludes by affirming the efficacy of the proposed approach, noting its capability to detect anomalies in real-life HPC system scenarios. The approach holds promise for scalability and potential implementation in other complex computing systems.

2. Limitations

2.1 First Limitation/Critique

One limitation observed is the potential need for extensive customization of the approach for different HPC systems. Given the diverse nature and architecture of HPCs, a one-size-fits-all solution might not be ideal.

2.2 Second Limitation/Critique

The methodology heavily depends on historical data for predictions. This might pose a challenge in scenarios where sufficient historical data is not available, or when the system encounters a completely new type of anomaly.

3. Synthesis

The ideas presented in the paper hold significant potential for application in modern-day HPC systems, especially with the increasing reliance on these systems for complex computations. By effectively pinpointing anomalies, potential downtimes can be minimized, leading to more efficient and reliable computing. Additionally, with the continuous evolution of HPC architectures, the research offers a foundation that can be built upon for future advancements in anomaly detection mechanisms. This

research can also serve as a starting point for integrating AI-driven solutions in HPC systems to further enhance their anomaly detection capabilities.