The paper is titled "Revisiting Time Series Outlier Detection: Definitions and Benchmarks" and is authored by Kwei-Herng Lai, Daochen Zha, Junjie Xu, Yue Zhao, Guanchu Wang, and Xia Hu. The paper addresses the topic of time series outlier detection and the need for benchmarking existing algorithms. The authors highlight the use of synthetic datasets for evaluation and propose a behavior-driven taxonomy for time series outliers.

The paper begins by discussing the importance of outlier detection in time series data and mentions various algorithms that have been proposed for this task. However, the authors point out that there is a lack of standardized benchmarks for evaluating these algorithms. While real-world datasets are commonly used, they often contain mixed types of outliers, making it difficult to understand algorithm performance in handling specific outlier types.

To address this issue, the authors propose a behavior-driven taxonomy for time series outliers. They categorize outliers into point-wise outliers and pattern-wise outliers, providing clear definitions and contexts for each category. Based on this taxonomy, they introduce a general synthetic criterion for benchmarking algorithms and generate 35 synthetic datasets accordingly. Additionally, they identify four multivariate real-world datasets covering both point-wise and pattern-wise outliers from different domains.

The authors conduct extensive experiments to benchmark nine algorithms on the synthetic and real-world datasets. Surprisingly, they find that some classical algorithms outperform recent deep learning approaches for all types of outliers. They also observe that certain algorithms designed for point-wise outliers can detect pattern-wise outliers effectively. The datasets, preprocessing and synthetic scripts, and algorithm implementations are made publicly available.

The paper provides background information on outlier definitions in time series data and highlights the challenges associated with defining outliers in sequential data. It references previous studies that have used behavior analysis to define outliers in sequential data.

Please note that the content provided is a summary and does not include the full details and findings of the paper.