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Using and Visualizing Graphs and Graph Algorithms

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Representing HEP and astrophysics data as graphs (i.e. networks of related entities) is becoming increasingly popular. These graphs are not only useful for structuring data storage but are also increasingly utilized within various machine learning frameworks.

However, despite their rising popularity, numerous unused opportunities exist, particularly concerning the utilization of graph algorithms and intuitive visualization techniques.

This presentation will introduce a comprehensive graph framework designed for handling the HEP and astronomical data. The framework supports the storage, manipulation and analyses of the graph data, facilitating the use of elementary graph algorithms. Additionally, it enables the export of graph data to specialized external toolkit for more sophisticated processing and analysis.

An integral feature of the presented framework is its highly interactive, web-based graphical front-end. This interface provides users with deep insights into the graph structures of their data, enabling interactive analysis and multi-faceted visualization of graph properties. It also offers integration capabilities with other related frameworks.

The practical application of this framework will be demonstrated through its use in analyzing relationships between astronomical alerts, specifically from the Zwicky Transient Facility (ZTF) and the Rubin Observatory. By leveraging the collective properties and relationships within these data, the framework facilitates comprehensive analyses and provides recommendations based on object similarities and neighborhood characteristics. This approach paves the way for novel insights and methodologies in approach to data.

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