In the context of graph data analysis, "node features" and "node attributes" are related but distinct concepts:

1. **Node Features**:
   * Node features are quantitative or descriptive characteristics associated with each node in a graph.
   * These features are typically used as input to machine learning models that operate on graph data.
   * Node features are often represented as vectors, where each element of the vector corresponds to a specific feature or attribute of the node.
   * Node features are used to capture information about the nodes themselves, such as numerical values representing properties of the nodes or embeddings learned from the node's neighborhood.
   * Node features are essential for various graph-based machine learning tasks like node classification, where you predict labels for nodes based on their features.
2. **Node Attributes**:
   * Node attributes are additional information or metadata associated with nodes in a graph.
   * Unlike node features, node attributes are not used as input to machine learning models but provide supplementary information about the nodes.
   * Node attributes can be of different types, including categorical, textual, or any other form of descriptive information.
   * Node attributes can be used for tasks like data visualization, network analysis, or enhancing the interpretability of the graph.
   * Node attributes can provide context or annotations for nodes, which can be valuable in understanding the graph's structure and content.

In summary, the main difference between node features and node attributes is their primary purpose:

* **Node Features** are used as input for machine learning tasks and are typically numeric representations of the nodes, allowing the model to make predictions or classifications based on these features.
* **Node Attributes**, on the other hand, provide additional descriptive information about nodes and are not directly used as input to machine learning models. They can be used for various purposes, including visualization and improving the understanding of the graph's content.