

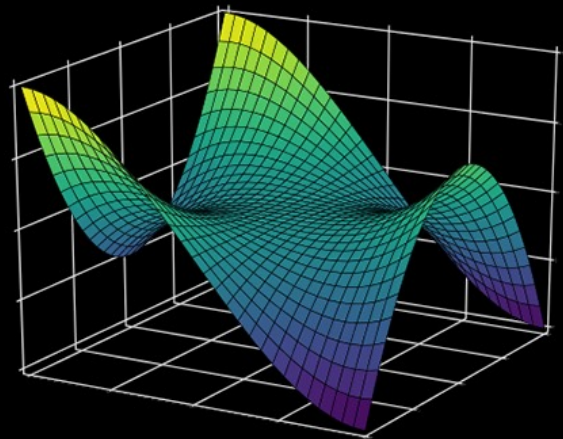
12 MAY 2024

BUSINESS PROCESS MINING

ALPHA ALGO



21I-1112, 21I-1205



PROCESS DISCOVERY

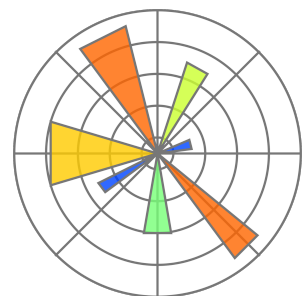
Introduction:

Process discovery plays a pivotal role in understanding and optimizing organizational workflows by uncovering hidden patterns within event data. Among the various algorithms employed for this task, the Alpha algorithm stands out as a powerful tool. Developed based on the idea of directly-follows relationships, the Alpha algorithm efficiently extracts process models from event logs, providing insights into the sequence of activities and their relationships. In this introductory exploration of process discovery using the Alpha algorithm, we delve into its principles, methodology, and practical applications. Through this journey, we aim to unlock the potential of process mining for enhancing organizational efficiency and decision-making.

Objective:

- The objective is to explore the process discovery methodology using the Alpha algorithm. By employing the Alpha algorithm, we aim to:
- Understand the principles underlying process discovery and process mining.
- Gain proficiency in preprocessing event logs to extract valuable insights.
- Implement the Alpha algorithm to discover process models from event data.
- Visualize discovered process models to comprehend workflow patterns.
- Evaluate the effectiveness of the Alpha algorithm in uncovering underlying process structures.
- Draw practical implications for optimizing organizational workflows and decision-making processes.

Tools:



Methodology

The process discovery and visualization pipeline involve the following steps:

PREPROCESSING THE EVENT LOG:

- Reading the event log from an Excel file.
- Grouping events by ticket number to generate traces.

IDENTIFYING DISTINCT ACTIVITIES (TL):

Extracting unique activities from traces.

IDENTIFYING START AND END EVENTS (TI AND TO):

Identifying the first and last events in each trace.

IDENTIFYING SUCCESSOR AND PREDECESSOR ACTIVITIES (PL AND FL):

Determining which activities follow and precede others.

VISUALIZING THE DISCOVERED PROCESS:

Creating a directed graph representing the process flow.

Utilizing NetworkX and Matplotlib libraries for visualization.

SIMULATING EXECUTION ON THE DISCOVERED PROCESS:

Checking whether each trace adheres to the discovered process flow.

Results

DISTINCT ACTIVITIES (TL):

TL: {'alert stage 3', 'pending release', 'Pending Customer', 'Open', 'Pending Vendor', 'acknowledged notification', 'pending customer', 'alert stage 2', 'pending repair', 'reassigned-misrouted', 'communication with provider', 'waiting parts', 'pending provider', 'communication with customer', 'Assignment', 'Restored to Service', 'restarted notification', 'analysis/research/tech note', 'restored to service', 'Manually Acknowledged', 'reassigned-addl work required', 'Acknowledged', 'pending confirmation', 'pending vendor', 'Closed', 'Work in Progress', 'alert stage 1', 'equipment return', 'automated', 'DEADLINE ALERT', 'communication with vendor', 'status request'}.

START AND END EVENTS (TI AND TO):

TI: {'acknowledged notification', 'Open', 'Closed', 'Assignment'}

TO: {'Closed', 'pending release', 'pending repair', 'Open', 'pending customer'}

SUCCESSOR AND PREDECESSOR ACTIVITIES (PL AND FL):

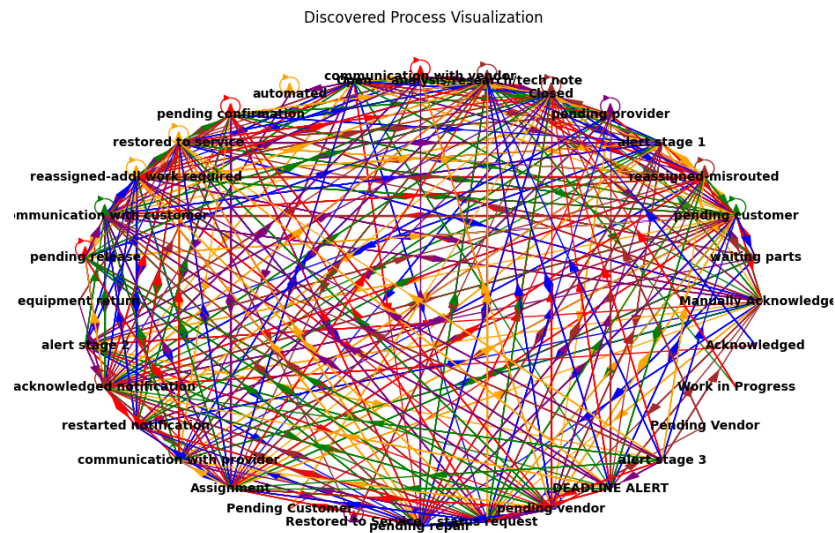
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VISUALIZATION OF THE DISCOVERED PROCESS:



Insights

The visualization provides a clear overview of the process flow, highlighting the sequence of activities and their relationships.

Simulation of trace execution helps identify deviations from the expected process flow, facilitating error detection and process improvement.

Conclusion

The analysis successfully uncovers the underlying process flow from the event data. Visual representation enhances understanding, while simulation enables validation of discovered patterns against actual traces. This methodology provides a robust framework for process discovery and analysis, with potential applications in various domains