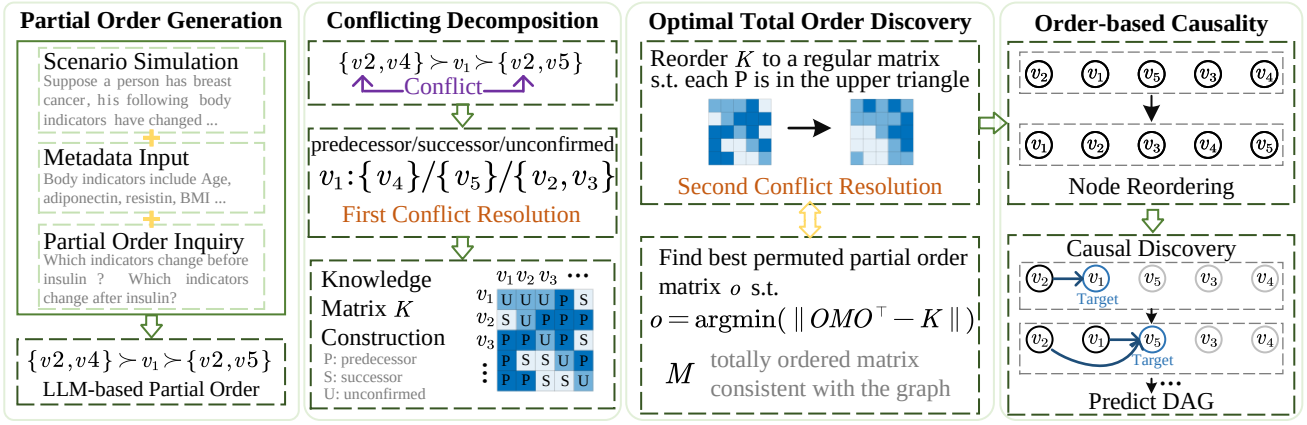
Partial Order Generation
Scenario Simulation
Suppose a person has breast cancer, his following body indicators have changed ...
Metadata Input
Body indicators include Age, adiponectin, resistin, BMI ...
Partial Order Inquiry
Which indicators change before insulin ? Which indicators change after insulin?
$\{v2,v4\} \succ v_1 \succ \{v2,v5\}$
LLM-based Partial Order
Conflicting Decomposition
$\{v2,v4\} \succ v_1 \succ \{v2,v5\}$
Conflict
predecessor/successor/unconfirmed
$v_1 : \{v_4\}/\{v_5\}/\{v_2,v_3\}$
First Conflict Resolution
Knowledge Matrix K Construction
P: predecessor
S: successor
U: unconfirmed
v_1 v_2 v_3 ⋯
v_1 U U U P S
v_2 S U P P P
v_3 P P U P S
P S S U P
P P S S U
Optimal Total Order Discovery
Reorder K to a regular matrix s.t. each P is in the upper triangle
Second Conflict Resolution
Find best permuted partial order matrix o s.t.
$o = \text{argmin}(\| OMO^\top - K \|)$
M totally ordered matrix consistent with the graph
Order-based Causality
v_2 v_1 v_5 v_3 v_4
v_1 v_2 v_3 v_4 v_5
Node Reordering
Causal Discovery
v_2 v_1 v_5 v_3 v_4
Target
v_2 v_1 v_5 v_3 v_4
Target
⋯
Predict DAG