Conservative Hybrid Framework

Phase 1: Skeleton Learning

Observational Data D → **PC Algorithm (Skeleton + V-structure)** → **PDAG (with undirected edges)** → **Extract Undirected Edges**

For each undirected edge (Xi, Xj)

Statistical Feature Extraction (Skewness, HSIC, R², Heteroscedasticity) → **StatTranslator** (Numbers → Natural Language Narrative) → **LLM Inference** (GPT-4 / DeepSeek with ACR Prompt) → **Causal Direction** (A→B / B→A / Unclear + Confidence)

Final DAG

Fallback: If Unclear, keep edge undirected

Phase 2: Conservative Refinement (ACR Engine)