Multi-Agent System for Automated Related Work Generation

Problem Statement

-LLLMs produce hallucinations
-Poor citation accuracy
-Lack of synthesis and critical analysis in generated text
Need: Colloborative workflow

Key Innovation

Simulates iterative, collaborative workflow of human researchers through specialized agent decomposition + self-correction

Multi-Agent Architecture

LangGraph Orchestration
Stateful workflow management

Planner Agent

Outliner Agent

Writer Agent

Critic Agent

Self-correction loop

Qwen3-8B (4-bit quantized)
LangChain Framework

Infrastructure

NVIDIA RTX 4080 Laptop GPU

VLLM Inference Engine
High-throughput serving

Evaluation Dataset: Multi-XScience

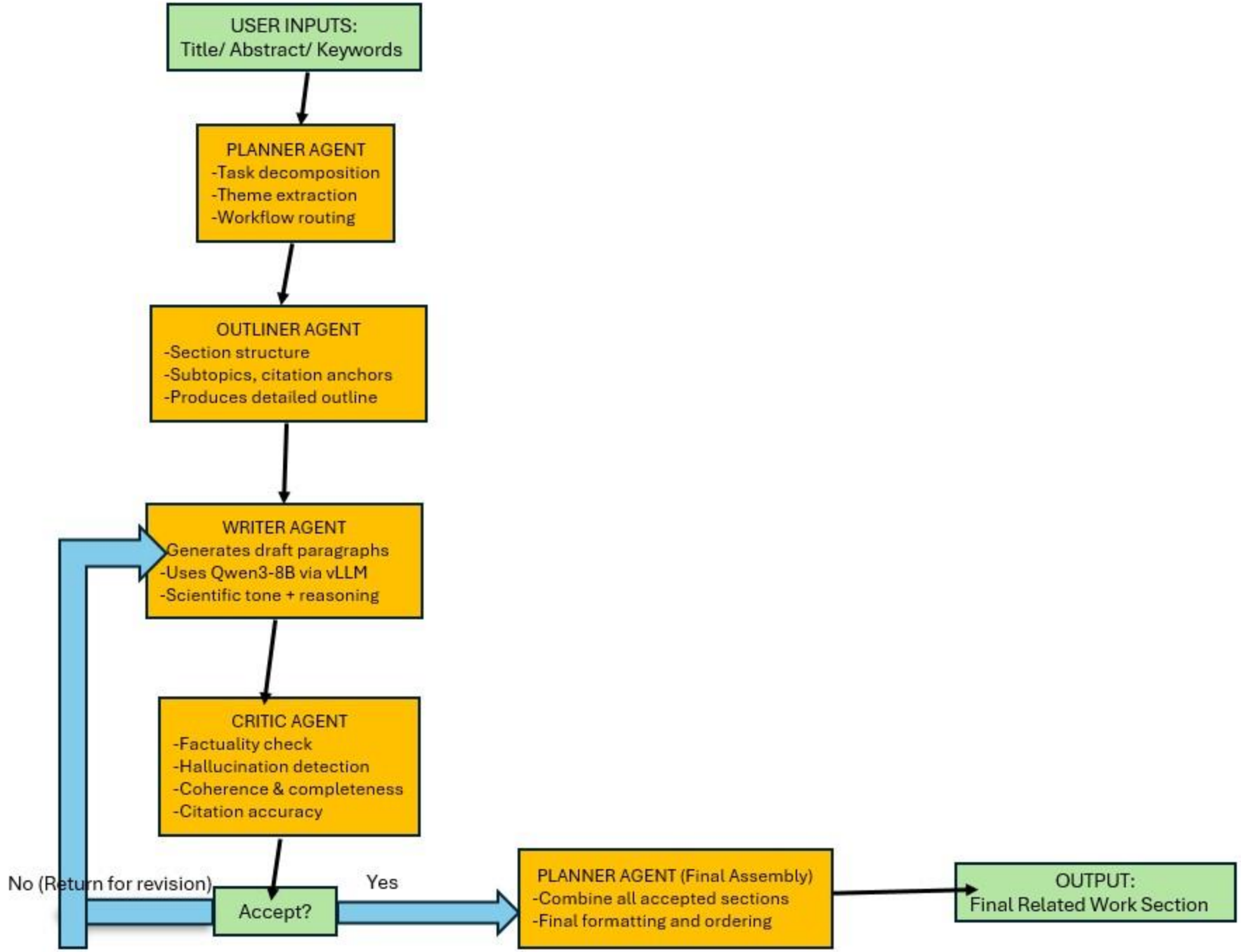
Expected Outcomes

Thematically coherent output

Accurate citations

Impact & Validation

Addresses critical limitations in LLM-generated academic content by ensuring factually grounded, high-quality Relted Work sections through multi-agent collaboration.
Validated using Multi-XScience dataset with varios metrics for evaluation


USER INPUTS:
Title/ Abstract/ Keywords
PLANNER AGENT
-Task decomposition
-Theme extraction
-Workflow routing
OUTLINER AGENT
-Section structure
-Subtopics, citation anchors
-Produces detailed outline
WRITER AGENT
Generates draft paragraphs
-Uses Qwen3-8B via vLLM
-Scientific tone + reasoning
CRITIC AGENT
-Factuality check
-Hallucination detection
-Coherence & completeness
-Citation accuracy
No (Return for revision)
Accept?
Yes
PLANNER AGENT (Final Assembly)
-Combine all accepted sections
-Final formatting and ordering
OUTPUT:
Final Related Work Section

Quantitative Metrics (Automated)

Model	ROUGE-L	Citation F1	BERTScore
Local 0-Shot	0.118	0.086	0.758
Local 5-Shot	0.126	0.091	0.769
Gemini 5-Shot	0.119	0.291	0.774

Qualitative Metrics (LLM Judge)

Model	Grounding	Relevance	Coherence
Local 0-Shot	7.900	8.600	9.200
Local 5-Shot	7.100	7.700	8.600

Full Comparison (Local Models)

Model	ROUGE-L	Citation F1	BERTScore	Grounding	Relevance	Coherence
Local 0-Shot	0.118	0.086	0.758	7.900	8.600	9.200
Local 5-Shot	0.126	0.091	0.769	7.100	7.700	8.600