BugSage Proposal — AI-Powered Root Cause Analysis Assistant

Purpose

BugSage is an AI tool designed to automate and accelerate **root cause analysis (RCA)** for software bugs and system failures. While many tools assist with bug detection or logging, BugSage focuses on **explaining why** a bug occurred by analyzing code changes, logs, dependencies, and historical patterns — a critical but often manual and time-consuming task.

Workflow

1. **Trigger Detection**
    - Integrates with CI/CD pipelines and issue trackers (e.g., GitHub, Jira).
    - Automatically activates when a test fails or a bug is reported.
2. **Context Aggregation**
    - Pulls relevant logs, stack traces, recent commits, and affected modules.
    - Uses semantic code analysis to understand the flow and dependencies.
3. **Causal Inference Engine**
    - Applies graph-based reasoning and LLM-powered code understanding to trace the likely origin of the fault.
    - Highlights suspect commits, misconfigurations, or race conditions.
4. **Explanation & Recommendation**
    - Generates a natural language summary of the root cause.
    - Suggests targeted fixes or rollback strategies.
    - Links to similar past incidents for faster resolution.
5. **Team Feedback Loop**
    - Engineers can validate or refine the RCA.
    - BugSage learns from corrections to improve future accuracy.

Impact

- **Reduces RCA time** from hours to minutes, especially in complex systems.
- **Improves team knowledge** by documenting causal chains and fix strategies.
- **Boosts reliability** by identifying systemic patterns across incidents.
- **Enhances onboarding** by helping new engineers understand legacy bugs and architecture quirks.

BugSage transforms RCA from a reactive chore into a proactive, intelligent process — empowering teams to fix smarter, not just faster.