Enhancing Software Development: An Interactive Code Debugger

Exploring the Problem, Related Works, and Work Plan for Implementation

Problem Statement

Overview of the Problem

Many beginner programmers struggle with debugging due to unclear error messages and lack of guidance.

Existing debugging tools in IDEs provide error messages but do not offer step-by-step explanations or interactive assistance, making it difficult for beginners to understand and fix errors efficiently.

Related Works: Existing solution and Limitations.

Integrated Development Environments (IDEs)

Key Contributions: Tools like PyCharm and VS Code provide error messages and basic debugging features.

Limitations: Lack beginner-friendly explanations and do not offer interactive step-by-step guidance.

Online Debuggers

Key Contributions: Platforms such as PythonTutor and Replit offer visualization of code execution.

Limitations: Limited real-time assistance and no detailed suggestions for fixing errors.

Linting Tools

Key Contributions: Tools like pylint and flake8 help detect syntax and style issues.

Limitations: Do not provide interactive debugging help or guidance for beginners.

Slide 3:Work Plan

Phase 1: Error Detection & Explanation (Weeks 1-4)

Implement real-time detection of syntax and runtime errors

Translate complex error messages into beginner-friendly explanations

Enhance understanding of coding errors

Phase 2: Suggested Fixes & Interactive Debugging (Weeks 5-8)

Develop features that provide step-by-step guidance for resolving errors

Include variable tracking and real-time execution tracing

Facilitate interactive debugging

Phase 3: Frontend Development & User Testing (Weeks 9-12)

Create a user-friendly web-based or desktop interface

Use technologies like Flask and CodeMirror or PyQt

Conduct usability testing with beginner programmers to gather feedback

Final Deliverable

Launch a comprehensive interactive code debugger

Designed specifically for beginners

Aimed at improving understanding and efficiency in fixing coding errors