**A Minor Project Synopsis: AI for code review automation**

**on**

**Project Title: Bug Bot**

Submitted to Manipal University Jaipur

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**In**

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**Synopsis**

**1. Introduction**

Software development is a critical aspect of the modern technological landscape, with programming languages being the foundation for building various applications. However, coding errors, both syntactic and semantic, can lead to inefficiencies, security vulnerabilities, and software malfunctions. Detecting and correcting these errors early in the development cycle is essential to ensure the quality and functionality of software.

This project aims to create an AI-assisted syntax and semantic error detection tool that utilizes static analysis tools such as pylint and flake8 for syntax checking while leveraging a Large Language Model (LLM) like OpenAI's GPT for providing semantic feedback. The project will serve as an educational aid for beginner programmers, helping them understand and improve their code quality with automated feedback.

**2. Motivation**

As novice programmers, we often struggle with debugging and understanding our coding mistakes. While static analysis tools provide syntax checking, they lack the ability to offer meaningful explanations or logical corrections. With the increasing integration of AI in software development, an intelligent system that not only detects errors but also explains them in a user-friendly manner can significantly enhance learning. This project is driven by the need to bridge the gap between static error checking and intelligent feedback, making debugging more intuitive for beginners.

**3. Project Objectives**

* Develop an AI-assisted tool that detects syntax and semantic errors in Python code.
* Provide beginner-friendly explanations and suggestions for code improvement using a Large Language Model.

**4. Methodology/ Planning of work:**

The project will follow a structured approach, divided into multiple phases:

1. **Learning Phase (Weeks 1-2):**
   * Understanding Python basics and static analysis tools.
   * Exploring OpenAI API for AI-based code analysis.
2. **Development Phase (Weeks 3-6):**
   * Setting up the development environment.
   * Implementing syntax analysis using pylint and flake8.
   * Integrating OpenAI API for semantic feedback.
   * Creating an interface (command-line or web-based using Streamlit).
3. **Testing & Optimization (Weeks 7-8):**
   * Running test cases to validate tool accuracy.
   * Refining explanations and improving the user experience.
   * Writing documentation and preparing the final report.

**5. Facilities required for proposed work:**

* **Software:**
  + Python 3.x
  + pylint and flake8 (Static analysis tools)
  + OpenAI API
  + VS Code or PyCharm (IDE)
  + Streamlit (for optional web-based UI)
* **Hardware:**
  + A computer with at least 4GB RAM and an internet connection for OpenAI API access.

**Bibliography/References**

* Python Software Foundation. "Python Documentation." <https://docs.python.org/3/>
* OpenAI API Documentation. "How to Use GPT Models." <https://platform.openai.com/docs/>
* pylint Official Documentation. "Static Code Analysis for Python." https://pylint.pycqa.org/
* flake8 Official Documentation. "Python Code Linter." https://flake8.pycqa.org/