**PROJECT REPORT**

**AUTOMATED CODE REFACTORING TOOL**

**GROUP MEMBERS:**

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**ABSTRACT:**

This report describes the design and implementation of the Automated Code Refactoring Tool Management System, a project focused on the optimization of legacy codebases by using intelligent automation. It finds inefficiencies, applies standardized refactoring patterns, and provides an intuitive user interface to revolutionize software maintenance and scalability.

**1.INTRODUCTION:**

Maintenance of legacy codebases is very time-consuming and usually full of inefficiencies. Manual refactoring involves a lot of developer effort, which reduces productivity and increases the possibility of errors. The proposed solution addresses these challenges through automation in the detection of code smells and refactoring opportunities while offering a user-friendly interface for developers.

**2. TECHNOLOGY USED:**

The system utilizes the following technologies:

• Frontend: React (JavaScript, HTML, CSS) for a modern and responsive user interface.

• Backend: Node.js, Flask/Django (Python) for API endpoints and refactoring logic.

• Database: PostgreSQL and SQLite for a scalable rule management schema.

• Development & Testing: VS Code, PyCharm, and PyTest for continuous integration and modular testing.

**3. IMPLEMENTATION OVERVIEW:**

The automated code refactoring tool management employs modern technologies and techniques to tackle inefficiencies in legacy software systems. It combines Node.js with Flask/Django for backend API endpoints, also uses SQLite for scalable rule management. The code is run in visual studio code environment and also some additional extensions like ESlint, prettier, tailwind is installed. Then in the terminal or power shell run three npm commands. By running this, we will get an URL as an output.

**4. SIGNIFICANCE AND CHALLENGES FACED**

**CHALLENGES:**

* Database Structure: Creating a database structure that can accommodate different refactoring rules without becoming overly complex was a challenge. Since refactoring patterns may need to be updated or extended, we designed a modular table structure. This will allow us to add, update, or remove refactoring patterns without disrupting the existing database schema, ensuring scalability.
* Code Analysis component: Developing a reliable code parser was initially more complex than expected. Legacy code can be highly variable, with different structures and styles, which makes automated analysis tricky. We explored different code parsing libraries and techniques, working towards a solution that can accurately identify refactoring opportunities. Testing on sample legacy code has helped us refine this component.
* Agile Project Management: Adapting to an agile methodology required some adjustment, as agile methods necessitate continuous feedback and iterative development. To manage tasks effectively, we organized the project in Trello, breaking down each phase into sprints and assigning specific tasks. This has streamlined our workflow and helped address the challenges of agile adaptation by keeping the project organized and adaptable.

**SIGNIFICANCE:**

1. **Efficiency:** The tool automates time-consuming refactoring tasks, saving approximately 50% of developer time.
2. **Quality:** It ensures consistent code quality across projects, achieving up to 90% standardization.
3. **Scalability:** The system adapts to multiple programming languages, increasing its applicability three- fold.

**5. FUTURE IMPROVEMENTS:**

The code can be improved to include more programming language support. As nowadays there is demand for AI, utilizing the machine learning models can help improving the refactoring. Also make it able to support the cloud deployment

**6. CONCLUSION:**

The Automated Code Refactoring Tool Management System offers a transformative approach to legacy code maintenance. By combining advanced analysis, intelligent refactoring, and user-friendly design, the tool enables developers to focus on innovation while ensuring code quality and scalability.

**7. REFERENCES:**

* [**https://gitar.ai/blog/automated-code-refactoring**](https://gitar.ai/blog/automated-code-refactoring)
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