Distributed Inter-Connected Agent Framework for Code Understanding

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***Abstract- This paper leverages the power of Artificial Intelligence (AI) agents to enhance the understanding and analysis of our code. The approach involves by examining the structure of the software project and creates the number of agents based on number of files and folders which contained in it. Based on this the dynamic system of AI agents responsible for processing specific files and folders are created. These agents are designed to operate autonomously yet collaboratively, parse, interpret, and extract insights from the code. The results generated by individual agents are aggregated and synthesized by a master node. The master node will be trained to consolidate the outputs to deliver correct response to user’s prompt. This is a multi-agent architecture which focus on efficiency of code understanding for betterment of software development.***

**Index Terms- Artificial Intelligence (AI) agents, multi-agent systems, dynamic agents, deep learning, machine learning.**

1. INTRODUCTION

As software systems grow in size and complexity, understanding their structure and analyzing their code has become a challenging yet essential task for developers. Modern software projects often consist of numerous interconnected files and folders, making it difficult to efficiently interpret and manage the codebase using traditional methods. This paper addresses this challenge by introducing a novel framework that leverages Artificial Intelligence (AI) agents to simplify and enhance the process of code understanding.

The proposed approach begins by analyzing the structural composition of a software project, determining the number of files and folders it contains. This information is then used to dynamically create AI agents, each of which is assigned to analyze specific files or folders. These agents are designed to operate independently while collaborating with other agents, ensuring comprehensive analysis of the entire project. The agents utilize advanced AI capabilities to interpret the code, identify patterns, and generate meaningful insights specific to their assigned segments.

At the core of this framework is a master node that orchestrates the activities of all the agents. The master node consolidates the individual outputs generated by the agents, integrates the findings, and produces a cohesive response to the user's prompt. This centralized coordination allows for intelligent decision-making and seamless aggregation of insights, offering developers a clear understanding of their codebase in response to their queries.

The advantages of this approach are multifold. By distributing tasks across multiple agents, the framework enables parallel processing, reducing the time required for analyzing large projects. The dynamic allocation of agents based on project structure ensures scalability and adaptability, making it suitable for diverse software systems. Additionally, the collaborative interaction between agents enhances accuracy and detail in code analysis, facilitating deeper understanding and better decision-making.

This paper aims to explore the design and implementation of this multi-agent system, showcasing its potential to transform code comprehension into a more efficient, scalable, and intelligent process. It highlights the role of AI agents in simplifying complex tasks, emphasizing their impact on the software development lifecycle. Through this research, developers can gain valuable insights into adopting AI-driven solutions for managing and understanding large codebases, paving the way for advancements in software engineering and artificial intelligence integration.