

Peer Review

Review of: "Evaluating the Application of SOLID Principles in Modern AI Framework Architectures"

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This research evaluates how TensorFlow and scikit-learn adhere to the SOLID design principles, revealing that both frameworks selectively apply these principles based on domain-specific needs. TensorFlow emphasizes performance and scalability, occasionally compromising on principles like Single Responsibility and Interface Segregation. In contrast, scikit-learn adheres more closely to SOLID principles through consistent interfaces and modular design, though it too makes strategic deviations for optimization. The study highlights that applying SOLID principles in AI development is context-dependent, requiring a balance between traditional software engineering practices and the flexible, performance-driven nature of AI frameworks. The novelty of this work lies in its exploration of how foundational software design principles interact with the unique constraints of AI framework development—a perspective rarely addressed in existing literature. While the research paper presents a novel and effective approach, there are areas that could benefit from further refinement and improvements for enhanced clarity.

- To further strengthen the paper, the authors could incorporate empirical benchmarks, extend the comparison to include additional AI frameworks, and discuss more deeply how these architectural decisions affect end-users and developers in real-world scenarios.
- The paper would benefit from a more detailed theoretical explanation of the SOLID principles and their relevance to software engineering. Currently, the discussion lacks depth in defining these principles and connecting them to broader architectural theories. Adding this context would enhance the paper's clarity and academic rigor.
- The significance of the research paper appears limited as it primarily focuses on a comparison of two AI frameworks without a broader exploration of how these findings can be generalized across other AI

tools or applied to real-world AI development scenarios. Expanding the scope to include additional frameworks or more detailed case studies could provide deeper insights and increase the paper's relevance to a wider audience.

- The motivation of the paper is somewhat unclear, as it lacks a detailed explanation of why evaluating AI frameworks against SOLID principles is important. A stronger motivation could emphasize the challenges AI frameworks face in balancing software engineering best practices with the unique demands of AI development. Highlighting how this evaluation can guide future framework design, improve maintainability, and contribute to the evolution of AI software engineering practices would provide clearer motivation for the research.

Declarations

Potential competing interests: No potential competing interests to declare.