Necessity of Fully Automated Computer Mathematics Systems (FACMS) and Meta-Mathematics Systems (FACMMS) for Advanced Theoretical Development

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Abstract

This paper explores the necessity of Fully Automated Computer Mathematics Systems (FACMS) and Fully Automated Computer Meta-Mathematics Systems (FACMMS) for the development of certain advanced mathematical theories. As the complexity of mathematical theories extends beyond the cognitive limits of human mathematicians, these automated systems become essential. We examine specific areas of mathematics where human capabilities may be insufficient and argue that the full realization of FACMS and FACMMS will enable the continuation of mathematical discovery in these domains.

1 Introduction

With the rapid advancement of mathematics, certain theoretical developments are emerging that may surpass human cognitive capacity. Inspired by Prof. Alan Bundy's work on "mathematical dilemmas," we explore how automated systems like FACMS and FACMMS can enable continued growth in complex mathematical domains. These systems facilitate problem-solving in areas that require computational power, logical precision, and iterative expansion beyond human capabilities.

2 The Role of FACMS and FACMMS in Advanced Mathematics

FACMS and FACMMS are automated systems designed to support rigorous, high-level mathematical research:

- **FACMS** manages calculations, symbolic manipulations, and proof validation, making it essential for theories with extensive computational requirements.
- **FACMMS** addresses meta-theoretical concerns, enabling systems to evolve self-referential frameworks and apply Scholarly Evolution Actions (SEAs) to expand foundational structures.

3 Domains Necessitating FACMS and FACMMS

We identify several domains that require the full realization of FACMS and FACMMS due to their inherent complexity:

3.1 Hyper-Extended Large Cardinal Theories

Hyper-extended large cardinal theories involve infinities beyond the current set-theoretic hierarchy. FACMMS is needed to process these intricate logical structures and support theories that transcend known infinities.

3.2 Multi-Dimensional Number Theory

Theories exploring high-dimensional number systems and automorphic forms in infinitely layered spaces would benefit from FACMS for computational exploration and FACMMS for evolving higher-order abstractions.

3.3 Theory of Infinite Mathematical Dilemmas

Paradoxes and dilemmas arising from self-referential structures in set and category theory demand FACMMS to manage paradox resolution dynamically, enabling stable, evolving theories.

3.4 Self-Referential Mathematical Theories

Self-referential theories require FACMMS for iterative adjustments to axioms and interpretations, enabling theories to evolve in response to new discoveries.

3.5 Multi-Multi-Universal Accessibility Frameworks

Theories designed for multi-universal application across infinite meta-levels require FACMMS to construct and manipulate frameworks for unifying mathematical structures across universes.

4 Conclusion

The realization of FACMS and FACMMS is not merely beneficial but necessary for the advancement of certain complex mathematical theories. These systems support a future of mathematical discovery where human cognition alone may be insufficient, opening pathways to novel, expansive frameworks.