

Proof Theory: Foundations and Applications

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Abstract: *Proof theory is a branch of mathematical logic that focuses on the nature of mathematical proofs. It aims to formalize proofs and understand their structure, complexity, and implications. This research paper delves into the core principles of proof theory, explores significant theorems and methodologies, and examines its applications in computer science, mathematics, and philosophy. By bridging theoretical insights with practical applications, this study underscores the importance of proof theory in advancing our understanding of logic, computation, and formal systems.*

Keywords: Proof theory