Seminar Materials on Automated Reasoning

A Comprehensive Collection

Author Name

A document presented for
the Automated Reasoning Seminar

Institution Name
Date

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1 Introduction

Welcome to the seminar on Automated Reasoning. This document is a compilation of various seminar materials designed to provide a comprehensive overview of the field. Here, we explore the fundamental concepts, methodologies, and applications of automated reasoning in computer science and logic.

2 Seminar Topics

2.1 Introduction to Automated Theorem Proving

Automated Theorem Proving (ATP) is a critical area within automated reasoning that focuses on the development of computer programs capable of proving mathematical theorems automatically. ATP systems are designed to assist mathematicians, logicians, and computer scientists in validating the correctness of propositions and theorems without human intervention.

The boolean satisfiability problem (SAT) is the following: given a formula F on propositional variables, does there exists an assignment $\mathcal{A}$ on theses variables, such that $\mathcal{A}(F) = 1$.

Given a formula F over a set of propositional variables $\{x_1, x_2, \ldots, x_n\}$,

$$\exists \mathcal{A} : \{x_1, x_2, \ldots, x_n\} \to \{0, 1\} : \mathcal{A}(F) = 1.$$