Logic - Theorem Formalization With a Proof Assistant

CSE 495 - First Presentation

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08.11.2023

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Definiton of Project

Proof assistant softwares are fairly new concept in computer science. LEAN is one of the most user friendly one. Like all others, it helps you manipulate the computer to check if the logic you follow make sense.

So in this project I will be using LEAN software and formalize some theorems.

Project Requirements

- Discrete Mathematics
- Logic
- Basic Understanding of Proof Methods
- LEAN Software

Proof Methods

Exhaustive Proof and Proof by Cases
Existence Proofs
Uniqueness Proofs

Exhaustive Proof and Proof by Cases

An exhaustive proof shows that a statement is true by considering and demonstrating all possible cases.
It leaves no room for uncertainty, as it covers every situation or condition.
It's like checking all the boxes to make sure nothing is left out.

Proof by cases breaks down a statement into separate cases or situations.
It shows that if the statement is true for each individual case, it is true overall.

Existence Proof

An existence proof demonstrates that something satisfying a particular condition or property does indeed exist.
It confirms that there is at least one example that meets the criteria.

Uniqueness Proof

A uniqueness proof demonstrates that there is only one thing that satisfies a certain condition or property.
It shows that no other options exist.

Success Criteria

- Discrete Math, Logic, Proof Methods Knowledge
- Learning LEAN Software
- Formalize theorem(s) with the help of LEAN Proof Assistant.