

Devanshu Surana

PC-23, 1032210755

Panel C, Batch C1

## AIES Lab Assignment 4

**Aim:** To implement Unification Algorithm

**Objective:** To study and implement Unification algorithm.

**Theory:**

### 1) Unification Algorithm:

1. It is a computational method used in symbolic reasoning and AI.
2. Used for finding a common substitute for variable in logical expressions.
3. This algo. plays a crucial role in various AI application such as NLP, automated theorem proving, etc.

**Condition for Unification:**

1. Predicate symbols must be same.
2. No. of args must be same for both literals.
3. Unification fails if two similar variables appear in same expression.

### 2) Resolution as Proof Procedure:

- A technique in automated theorem proving
- Assumes negation of the statement to be proved and attempt to derive a contradiction.
- Uses the resolution rule to determine combine clauses, aiming to prove the original statement true.



Input: Two literals  $L_1$  and  $L_2$

Output: A set of substitutions

Algo: Unification Algorithm

### FAQ's

1. Why resolution is required?

→ It is a fundamental technique in automated theorem proving which is crucial in various fields of comp. Sci, AI and formal logic. It enables the automatic derivation of new logical conclusions from a set of existing premises.

Resolution is a complete inference rule, meaning that if there is a valid logical deduction to be made, resolution will eventually find it.

2. What are prerequisites for applying unification algorithm?

→ 1. Logical Statements: You need a set of logical statements / predicates, typically represented in first-order logic.

2. Variable and constants: These statements should contain variables and constants, which are symbols representing variables.

3. Unification Terms: The literals should follow the conditions for unification.

3. What are the applications of Unification Algorithm?

→ Automated theorem proving in AI.

NLP for sentence parsing

Type Inference in programming languages

Knowledge representation in expert systems.