Lab Assignment 7

Subject: Artificial Intelligence **Guided by:** Dr. Anuradha Yenkikar

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Experiment Name: Implement Forward Chaining Algorithm.

Objective:

The objective of this lab assignment is to implement the forward chaining algorithm, a fundamental technique in artificial intelligence used for reasoning in rule-based systems. The goal is to infer new facts based on a set of initial facts and defined rules.

Problem Statement:

In this exercise, you will simulate a simple expert system that uses forward chaining to infer new information from given facts and rules. The system will begin with a set of known facts and apply rules iteratively to derive new facts until no further conclusions can be drawn.

Requirements:

- Programming Language: Python

- Environment: Any Python IDE (e.g., PyCharm, Jupyter Notebook)

- Python Version: 3.6 or higher

Code Explanation:

1] Code Overview

The provided code defines a simple forward chaining algorithm that uses initial facts and a set of rules to infer new facts.

2] Components of the Code

- Facts: A list of known facts. In this case, the facts are `["A", "B"]`.

- Rules: A list of tuples, where each tuple contains a list of conditions and a conclusion.

  - For example, `(["A", "B"], "C")` means that if both A and B are true, then C can be inferred.

- forward_chaining(facts, rules):

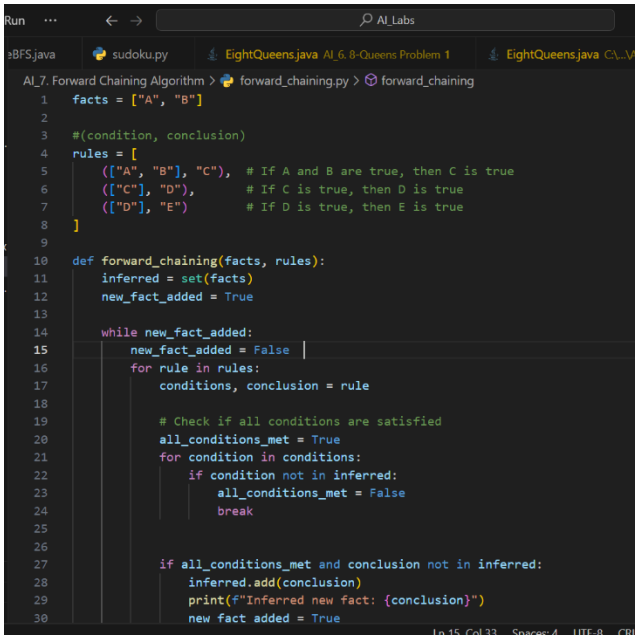
  This function implements the forward chaining algorithm:

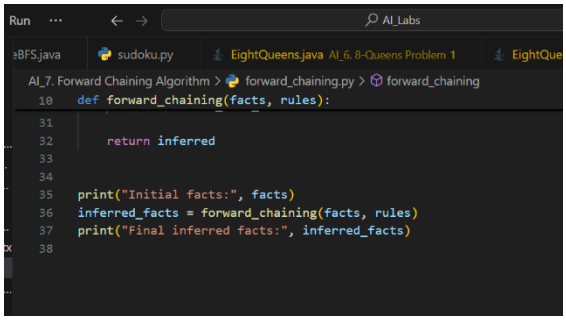
  - It starts with the initial facts and tries to infer new facts using the provided rules.

  - The algorithm continues until no new facts can be inferred.

3] Code Implementation

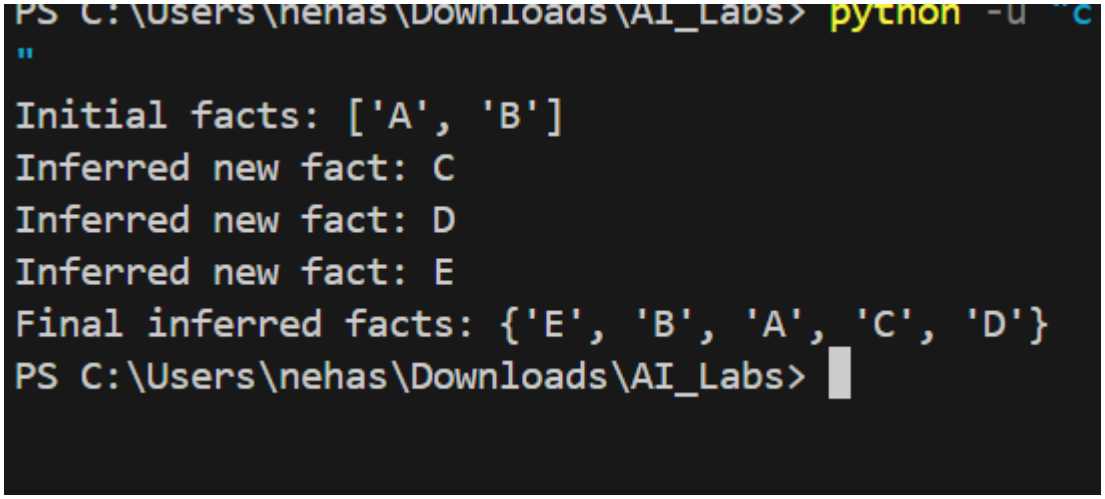
Here's the complete implementation of the forward chaining algorithm:





4] Output

The program will output the initial facts, any newly inferred facts, and the final set of inferred facts. An example output might look like this:



Working of the Code:

1. Initialization: The initial facts are defined, and a set of rules is established.

2. Inference Process:

- The algorithm uses a while loop to continue inferring new facts until no new facts can be added.

- For each rule, it checks if all conditions are satisfied. If they are and the conclusion is not already inferred, it adds the conclusion to the set of inferred facts.

- The process repeats until no new conclusions can be drawn.

3. Result Display: Finall y, the inferred facts are printed.

Conclusion:

In this lab, I have successfully implemented the forward chaining algorithm to infer new information in a rule-based system. This exercise has enhanced my understanding of rule-based reasoning and how to implement logical inference using programming.