# **Practical 02: Building an Expert System Using Rule-Based Systems**

**Objective:** Develop an Expert System that provides simple decision-making.

## **Problem Statement**

Creating a simple Expert System that can be demonstrated to introduce Artificial Intelligence, decision-making algorithms, and rule-based systems.

**Topic Chosen:** **Expert System for Career Path Suggestion Based on Student Interests**

## **What is an Expert System?**

An Expert System mimics the decision-making ability of a human expert. It uses a **set of rules** and a **knowledge base** to make decisions or solve problems in a specific domain. Expert systems are widely used in domains such as medicine, engineering, education, and business decision-making.

## **Tools and Technologies**

* **Language:** Python
* **Interface:** CLI (Command Line Interface)
* **Logic Engine:** PyKnow / Experta (Python library for Expert Systems)

## **Knowledge Base (Sample Rules)**

* IF student\_likes == "Maths" AND student\_likes == "Physics" → Suggest **Mechanical Engineering**
* IF student\_likes == "Programming" AND student\_likes == "Maths" → Suggest **Computer Engineering**
* IF student\_likes == "Biology" AND student\_likes == "Chemistry" → Suggest **Biotechnology**
* IF student\_likes == "Circuits" AND student\_likes == "Maths" → Suggest **Electronics Engineering**
* IF student\_likes == "Programming" AND student\_likes == "Statistics" → Suggest **Artificial Intelligence and Data Science**
* IF student\_likes == "Programming" AND student\_likes == "AI Concepts" → Suggest **Artificial Intelligence and Machine Learning Engineering**

## **Implementation**

Students can first implement the expert system logic using **basic Python if-else conditions**, and later extend it using the **experta** library.

### **Example: If-Else Implementation**

print("Welcome to the Career Path Expert System!")

interests = input("Enter your interests separated by commas: ").split(',')

if "Maths" in interests and "Physics" in interests:

print("Suggested Career Path: Mechanical Engineering")

elif "Programming" in interests and "Maths" in interests:

print("Suggested Career Path: Computer Engineering")

elif "Biology" in interests and "Chemistry" in interests:

print("Suggested Career Path: Biotechnology")

elif "Circuits" in interests and "Maths" in interests:

print("Suggested Career Path: Electronics Engineering")

elif "Programming" in interests and "Statistics" in interests:

print("Suggested Career Path: Artificial Intelligence and Data Science")

elif "Programming" in interests and "AI Concepts" in interests:

print("Suggested Career Path: Artificial Intelligence and Machine Learning Engineering")

else:

print("No direct career path suggestion found. Please refine your interests.")

### **Implementation Using Experta Library**

Note: Install experta with:

pip install experta

from experta import \*

class StudentFacts(Fact):

pass

class CareerExpertSystem(KnowledgeEngine):

@Rule(StudentFacts(likes='Maths'), StudentFacts(likes='Physics'))

def mechanical(self):

print("Suggested Career Path: Mechanical Engineering")

@Rule(StudentFacts(likes='Programming'), StudentFacts(likes='Maths'))

def computer(self):

print("Suggested Career Path: Computer Engineering")

@Rule(StudentFacts(likes='Biology'), StudentFacts(likes='Chemistry'))

def biotech(self):

print("Suggested Career Path: Biotechnology")

@Rule(StudentFacts(likes='Circuits'), StudentFacts(likes='Maths'))

def electronics(self):

print("Suggested Career Path: Electronics Engineering")

def main():

engine = CareerExpertSystem()

engine.reset()

print("Welcome to the Career Path Expert System!")

interests = input("Enter your interests separated by commas (e.g., Maths, Physics, Programming): ").split(',')

for interest in interests:

engine.declare(StudentFacts(likes=interest.strip()))

engine.run()

if \_\_name\_\_ == "\_\_main\_\_":

main()

## **Output Example**

**Input:**

Maths, Physics

**Output:**

Suggested Career Path: Mechanical Engineering

## **Conclusion**

This Expert System demonstrates how **rule-based systems** can be applied to decision-making in the field of **career guidance**. By using **if-else logic** and extending it with the **experta library**, students gain hands-on experience with the fundamentals of **Artificial Intelligence** and **knowledge-based systems**.