

Let's Go with Algo

By Melakeslean Moges

14-10-2023

Know Your Teammate

ICE BREAKER

Ask the following Questions to you Partner and Remember them.

1. What is your Name?
2. What is you Mother's Name?
3. Do you have a pet? If so what is it?
4. What is the Name of your School?
5. What is your favorite game, sport or passtime activity?

LECTURE 1

Problem Solving

Problem Solving - Define the problem

There are four basic steps in problem solving:

Define the problem

A **problem** is a **situation preventing** something from being **achieved** or **existing**. The word comes from a Greek word meaning an "**obstacle**" (something that is in your way). Someone who has a problem must find a way of solving it. The means of solving a problem is called a "solution".

○

Problem Solving - Define the problem

Examples

"John has locked his car keys inside his car so that he cannot get at them. John has a problem".

Breakdown:

- Who is the situation affecting
 - John
- What is the environment
 - Outside, possible on the street or in front of a building
- What is the situation
 - Car is locked
 - Keys are inside the car
 - John is outside of the car
- What is the desired outcome
 - John wants to get into the car - reasoning: car keys are for opening a car to get inside them

Problem Solving - Define the problem

Exercise (10 mins)

Write a problem statement from your experience. Identify the following parts in your statement:

- Who is the situation affecting
- What is the environment
- What is the situation
- What is the desired outcome

2 People Present

Problem Solving - Generate possible solutions

Some of them can be solved with **logic**, others can be solved by **trial and error** or by a *heuristic*.

Logic

is the **science** of **reasoning**. Logic helps **people** decide whether something is **true** or **false**.

Notations

\rightarrow (*is a | is equal to*)

\wedge (*and*)

$$((\text{human} \rightarrow \text{mortal}) \wedge (\text{Aristotle} \rightarrow \text{human})) \rightarrow (\text{Aristotle} \rightarrow \text{mortal})$$

Problem Solving - Generate possible solutions

Trial and Error

Is a primitive method of solving problems. It is characterised by repeated, varied attempts which are continued until success, or until the agent stops trying. It does not employ insight, theory or organised methodology.

Looking for my phone by looking in every container, asking every person around me, looking under every furniture until I find it.

Problem Solving - Generate possible solutions

Heuristic

is the **art** of finding an adequate solution to a problem, using limited knowledge and little time. It is a practical way to solve a **problem**. It is better than **chance**, but does not always work. A person develops a heuristic by using **intelligence**, **experience**, and **common sense**. **Trial and error** is the simplest heuristic, but one of the weakest. **Rule of thumb** and 'educated guesses' are other names for simple heuristics. Since a heuristic is not certain to get a result, there are always exceptions.

When doctors examine a patient, they go through a whole set of tests and observations. This is called a diagnosis, a process of elimination. They may not find out what is wrong, but they give themselves the best chance of succeeding.

Problem Solving - Generate possible solutions

Exercise (10 mins)

For your example above, write a possible solution for your problem using one of this techniques.

For the example above, a possible solution:

Using Logic:

- *Cars come with spare keys*
- *John locked his primary key inside the Car*
- *John can use the spare key to open the Car and get in.*

Problem Solving - Generate possible solutions

Using Trial and Error:

- *Check all doors if they are open*
- *Check all windows if they are open*
- *Cry! Scream!*
- *Ask people around if they know how to open a car*
- *Try to push the windows down*
- *Try to “Jimmy” the door open*

Problem Solving - Generate possible solutions

Using Heuristic:

- *Double check all doors and windows are actually locked*
- *Remember if the car has a spare key and if it is reachable*
- *Check for contact info for car key specialist or car mechanic in John's phone, internet and people around.*
- *Check the internet for suggestions on how to open a locked car door using available tools*

Problem Solving - Evaluate and select possible solutions

Having identified a possible set of solutions, check each one for

- **practicality** - doable with **available resources**,
- **time efficiency** - can be done with the **time available** using the **tools and technologies available**
- **result producing** - it will have a **measurable** and **finite** output

Choose the solution that satisfies the criteria the best.

Problem Solving - Implement solutions

Apply the solution(s) selected as per the steps predefined and check the result. If it does not solve the problem, identify the source of the failure in the solution, improve the steps and apply the solution again. This is known as the [Iterative Process](#).

! FUN TIME !

Scavenger Hunt: **The Pot of Gold at the End of the Rainbow**

General Instruction:

Below you will find a set of 12 tasks to be completed to solve the Problem of Finding the Treasure. You should follow and complete all the tasks correctly as given.

Time for the challenge:

10 minutes

Participation:

2 per team

! FUN TIME !

Scavenger Hunt: **The Pot of Gold at the End of the Rainbow**

How to start the tasks - Instruction:

1. Go to the Repository you setup on your local machine
2. Go to the folder: scavenger / hunt / tasks
3. Open the file by double clicking on the file **tasks_1.txt**
4. Write your response to each task on the space provided below it. If the task is a physical activity, type 'DONE' in the space provided.
5. When you are done, raise your hand.
6. Demo on the example.txt file

NOTE: If you don't follow the instructions as specified in the tasks, you will be disqualified from the 'Hunt'!

! FUN TIME !

Scavenger Hunt: **The Pot of Gold at the End of the Rainbow**

Types of Activities

Physical Activity	You will have to move around to perform this.
Calculation Activity	You will need to use your Math skills for this.
Query Activity	You will have ask someone for information for this
Memory Activity	You will have to remember information for this

! FUN TIME !

Scavenger Hunt:

The Pot of Gold at the End of the Rainbow

Dictionary

Key Word	Meaning
squats	bend your leg and sit on you heels and get up
query	ask question or search for information from a source

! FUN TIME !

Scavenger Hunt:

The Pot of Gold at the End of the Rainbow

DEMO

! FUN TIME !

Scavenger Hunt:

The Pot of Gold at the End of the Rainbow

! START !

! FUN TIME !

Scavenger Hunt:

The Pot of Gold at the End of the Rainbow

! STOP !

? QUESTIONS ?

DNAA == 'DoN't Assume Ask'