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The Tower of Hanoi test is a test that is used in neuropsychology to evaluate the executive functions of a child, adolescent and adult. The purpose of this test is to evaluate a person's planning, control, and organization abilities. The human brain performs planning as one of its executive functions. In other words, it refers to the ability of a subject to think about something concrete in advance. In order to plan effectively, you need to be able to evaluate and anticipate what may happen in the wake of your actions. Control is related to mastery, command or self-control over something. The ability to control impulses has to do with planning. Experiences from the past are taken into account in the control. The result is that it is a preventive and corrective mechanism based on the past experiences of each subject and planning or projections for the future. Organization is the way in which a subject is planned in anticipation of a certain activity. For optimizing time and results, the way in which the subject organizes different tasks will be crucial. Consequently, the organization clearly requires experience, trial and error to improve it.

Playing this game involves moving an entire stack of disks from one place to another. Three simple rules are followed:

1. Only one disk can be moved at a time.
2. Each move consists of taking the upper disk from one of the stacks and placing it on top of another stack. In other words, a disk can only be moved if it is the uppermost disk on a stack.
3. No large disk may be placed on top of a smaller disk.

Gráfico, Diagrama, Gráfico de barras

Descripción generada automáticamente

This code uses a simple recursive approach to solve the Tower of Hanoi problem. The base case is when there is only 1 disk, in which case it is simply moved from the source peg to the target peg. In the recursive case, we first move the top N - 1 disks from the source peg to the auxiliary peg using the target peg as the auxiliary. Then, we move the Nth disk from the source peg to the target peg. Finally, we move the N - 1 disks from the auxiliary peg to the target peg using the source peg as the auxiliary.

You can run the solution by calling the hanoi/1 predicate with the number of disks as an argument. For example, to solve the Tower of Hanoi with 3 disks, you would call hanoi(3).

This solution implements the basic recursive algorithm for the Tower of Hanoi problem and can be easily extended or modified for other applications.

**Code in Prolog:**

Texto

Descripción generada automáticamente

The code will throw us the movements that are generated by the code. According to the "movement" relationship, the first object indicates how many discs the tower of Hanoi has, and the second, third, and fourth objects indicate their direction of travel: left, right, or center, respectively. Therefore, move(N,X,Y,Z) will be true if N is greater than 1 disk, and M will take the value N - 1.

In the case of 3 disks the code will generate these steps:

Interfaz de usuario gráfica, Texto

Descripción generada automáticamente

In the case of 4 disks the code will generate these steps:

Texto

Descripción generada automáticamente

As previously explained, this recursive function will increase depending on the number of disks that you want to occupy; in the case of 3 discs, it generates 7 movements. Implementing it into the mathematical formula we would have 2^3-1 = 7; for 4 discs, 15 movements are generated and so on. (See Table 1)

Interfaz de usuario gráfica, Aplicación, Tabla, Excel

Descripción generada automáticamente

Link:

<https://github.com/ReginaFierro2000/Artificial-intelligence/blob/e51059b2f77d35a0c4f1780e16a4bc428c98a897/Project1/Hanoi%20Towers.pl>

Conclusion:

When we apply it to our lives, the Tower of Hanoi teaches us and enables us to have control over our actions, management, and organization. Applying it to mathematics and programming, it is possible to interpret the number of times actions are performed, no matter what type of situation. We can easily count on this recursive form, since the Tower of Hanoi encourages us to learn and practice the type of Prolog language (syntax) and thus to be able to handle it with ease and understanding. Correctly applying the 2^N-1 formula shows us how easy mathematics is and how it increases, that is, the greater the number of disks, the increased the number of movements of the same.

Reference:

<https://swish.swi-prolog.org/>

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