WORKSHEETS

El futuro digital es de todos

MinTIC

Worksheet 4.1

Reading text

What makes a good algorithm?

Algorithm VS Recipe

An algorithm specifies a series of steps that perform a particular computation. Algorithms are similar to recipes. Recipes tell you how to cook food by completing a number of steps. For example, to make a cake the steps are:

1. preheat the oven;
2. mix flour, sugar, and eggs;
3. pour into a baking pan;
4. etc.

But “algorithm” is a technical term and it is more specific than “recipe”.

Characteristics of an algorithm

If you call something “an algorithm”, it means that these characteristics are all true:

1. An algorithm is an unambiguous description that makes clear what to implement. In a computational algorithm, a step such as “Select a large number” is not clear: what is “large”? 1 million, 1 billion, or 100?
2. An algorithm expects a defined set of inputs.
3. An algorithm produces a defined set of outputs.

4. An algorithm is guaranteed to terminate and produce a result. If an algorithm could potentially be eternal and run forever, it wouldn't be very useful because you might never get a result.

5. The majority of algorithms are guaranteed to produce the correct result.

An Example Algorithm find_max()

Problem: From a list of positive numbers, return the largest number on the list.

Inputs: A list L of positive numbers. This list must contain at least one number.

Outputs: A number n, which will be the largest number of the list.

Algorithm:

- Set max to 0.
- For each number x in the list L, compare it to max. If x is larger, set max to x.
- max is now set to the largest number in the list.

An implementation in Python:

```
def find_max (L):
    max = 0
    for x in L:
        if x > max:
            max = x
    return max
```

Does this meet the criteria for being an algorithm?

1. Is it unambiguous? Yes. Each step of the algorithm consists of primitive operations, and translating each step into Python code is very easy.

2. Does it have defined inputs and outputs? Yes.

3. Is it guaranteed to terminate? Yes. The list L is not infinite, so after looking at every element of the list the algorithm will stop.

4. Does it produce the correct result? Yes.

WORKSHEET 4.2

EVALUATION

1. The objective of an algorithm is to:
a. Perform a computation
b. Perform a recipe
2. … is more specific.
a. Recipe
b. Algorithm
3. The instruction "Select a large number" is:
a. Ambiguous
b. Unambiguous
4. An eternal algorithm is:
a. Useful
b. Useless
5. The objective of "find_max" is:
a. To find many numbers
b. To find the largest number

WORKSHEET 4.3

SELF –EVALUATION

Answer the following questions:

1. Entiendo cómo utilizar la estrategia de previsualizar y predecir con un texto.

   Yes No Maybe

2. La estrategia de previsualizar y predecir me ayuda a tener una idea general de qué se va a tratar el texto.

   Yes No Maybe

3. La estrategia de previsualizar y predecir me ayuda a concentrarme más mientras leo.

   Yes No Maybe

4. Cuando previsualicé y predije el texto de esta clase, pude adivinar unos detalles correctamente.

   Yes No Maybe