**Facultad de Ingeniería en Electricidad y Computación**

**Artificial Intelligence**

**Members:**

* Iván Mosquera
* Kleber Diaz
* Edgar Carvajal

**Homework # 1.** Search Mechanisms:

**Work as a group** and answer each of the following questions. You must report only one document as a group, and place it in SIDWeb 4.0, section “Trabajos”.

1. **For each of the following problems, determine as a group, which search method: BREATH FIRST or DEPTH FIRST would you use? In each case justify the answer and report the conclusions.**
   1. **A program for playing tic-tac-toe**

When we are playing this kind of games we commonly ask one typical question “¿will this move lead me to the win?”, so for that if we see a tic-tac-toe as a tree with all the possible moves we can make, then it is a good idea to see what’s the potential of one specific move we are planning to do.

Then DEPTH FIRST is the choice for ours answers because it focus in finding one final result of a movement and not finding all the possible movements.

* 1. **A program for solving a maze**

The basic principle for solving a maze is to go from an entrance to a goal (exit), so for this we have to focus on finding the exit and no finding all the routes we can take.

If we see a maze as a graph/tree we can find out that the given routes can be seen as vertices and the intersections as nodes.

The BREATH FIRST search **cannot** be used because with this method we will first find all the routes an intersection can have before going through to any specific route for finding the exit.

The DEPTH FIRST search is the **best method** for this problem because it focus in going deep through the interceptions we are finding (stack) as deep as we can, if we find the exit, good; but if not, we would have finish that route until the end and not only a part.

* 1. **A program to determine if 2 mathematical expressions are equivalent.**

In this case, we would use the BREATH FIRST search method, because we make sure that the solution found is the one that contains the fewest steps, which in this case is the goal.

1. **As a group, describe what is uninformed and informed search? Give two examples of uninformed and informed search strategy.**

Uninformed search is the searching without information, this is that all generated states are found from the current state because there is no information, it is called brute force too, we generate all the possible states.

Informed search is searching with information, this is with previous information and using heuristic functions..

Examples:

For Uninformed search we have : Breadth-first search and Depth-first search

and for Informed : Best-first search and Greedy search

1. **As a group, discuss and describe which of the search techniques uses the problem specific knowledge beyond the definition of the problem? And explain why?**

From what we discuss in group we all agree that the search technique that uses specific knowledge of the problem is the heuristic search, because it uses information that is represented as a function in order to reduce the search of the solution.

Depending on the local information that gives us the problem we could evaluate how good are the heuristic techniques that we use in the search of the solution, because not always the one which is found is the best.

1. **The decision for doing DATA or GOAL DRIVEN search is generally based on the structure of the problem. As a group, discuss and report the conclusions about the characteristics of the structure that the problems should have. Report at least 3 characteristics for data driven and 3 for goal driven search.**

**Characteristics for Data Driven:**

* We use data driven when most of the data are given at the beginning of the problem, an example are interpretations problems that use this mold presenting a collection of data and inquire the system for interpretation
* Its very difficult to mold a goal or hypothesis
* Exist a large number of goals, but are only a few gays to use the data and the information of a problem instance.

**Goal driven search**

* A problem can be easy to formulated: In a Theorem of mathematics that have to be proved for example the goal is the theorem to be proved.

* Exist large numbers of rules that pair the facts of a determined problem and can produce an increase in the numbers of conclusions or goals. In a Theorem of mathematics that have to be proved for example, the total number of rules that may be applied to the entire set of axioms.
* Data of the problem are not given and have to be acquired by the solver of the problem In a medical diagnosis program,for example, an ample range of diagnostic tests can be applied. Doctors order only those that are necessary to confirm or deny a particular hypothesis.