



### General Purpose Heuristics and Backtracking

1. Let's have the following variables for the Australia Colouring Map Problem:

```
N=7; %% Region Number
variables=1:N; %%One Variable per Region: WA NT SA Q NGS V T
x=zeros(1,N); %% asignación WA NT SA Q NGS V T
domains=ones(N,3); % 1 Red 2 Green 3 Blue
G=[...]; %% Adjacency matrix (Copy from the campus)
```

2. Below you have a scheme of the Matlab scripts to implement general purpose heuristics to select next variable and to select next value.

In both functions, the first case corresponds to not apply any heuristic, just to take next variable o next value from the range.

```
function [v]=next_noassigned_var(x, domains, G, case)
%% returns next variable to be assigned
noassig=find(x==0);
if length(noassig)>0
    switch(case)
        case 1,
            %% Next variable, the first from the list

        case 2,
            %% Degree Heuristic

        case 3,
            %% Minimum Remaining Values (MRV)

        otherwise,
            v=0;
    end
end
```

```

function vals=ordered_values (v, case, ...)
%%%function ordered_values(v,...)
%%% returns the list of ordered values

vals=0;
possible=.. %% possible indices

if length(possible)>0
    switch(case)
        case 1,
            %% Assign the following unassigned value from the list

            case 2,
            %% Least Constraint Value

            otherwise,
                vals=0;
        end
    end
end

```

3. Include these functions in the backtracking algorithm and check that everything runs properly.