CS 380 Homework 1 – AI Beginnings

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2. Programming Assignment - Search/Functional Programming Beginnings *(30 points)* :

[Word Search puzzles]

*Summary

<Class>

```
class Grid:
```

A class for prints puzzle

```
class State:
```

A class for fill the given grid with a list of words

```
class Rule:
```

A class for check and decide how to move/do actions

<Function>

Class Grid :

```
def __init__(self, nRows, nCols):
```

A function to initialize the grid's properties

```
def __getitem__(self, index):
```

A function to choose position in grid

```
def __str__(self):
```

A function to print basic grid form

Class State :

```
def __init__(self, grid, words):
```

A function to initialize the state's properties

```
def __str__(self):
```

A function to print grid form and a word list

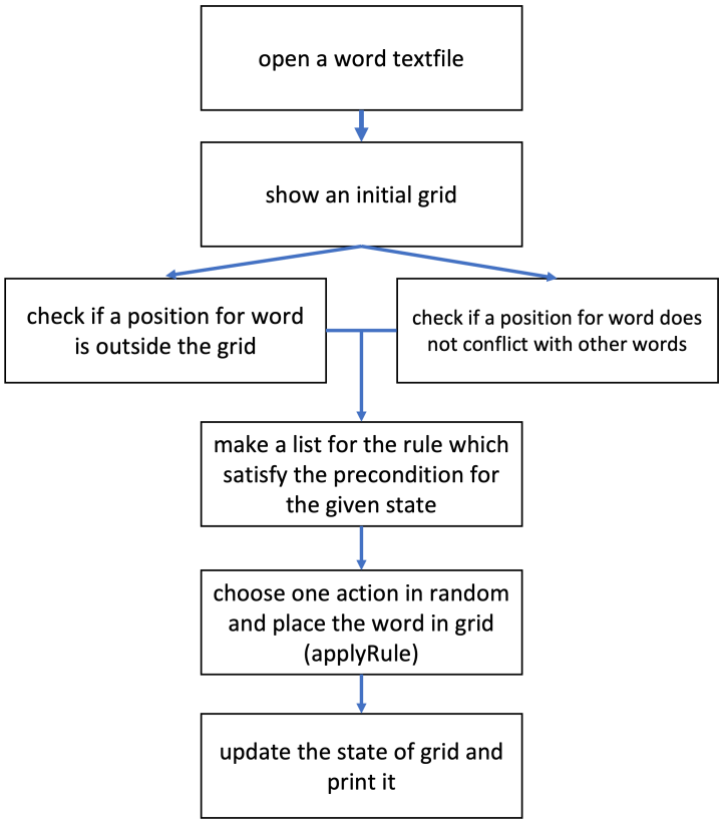
Class Rule :

```
def __init__(self,word,row,col,dh,dv):
```
A function to initialize the rule's properties
```
def __str__(self):
```
A function to explain the meaning of given rule
```
def applyRule(self,state):
```
A function to return the new state that results when applying a rule to a given state
```
def precondition(self,state):
```
A function to check if it is right or wrong with given rule

(Main Function)

```
def goal(state):
```
A function that checks if state satisfies given configuration
```
def allCandidates(word,state):
```
A function to return a list of rules that satisfy in given grid
```
def failyWidly(state):
```
A function to test the word search puzzle repeatedly by mixing most of key functions together

*Algorithm Diagram



*Test file (wordfile1.txt)

```
wordfile1.txt
ADMISSIBLE
AGENT
BACKTRACK
CANNIBAL
DEADEND
GLOBAL
GRAPHSEARCH
HEURISTIC
LISP
LOCAL
MISSIONARY
OPTIMUM
RATIONAL
SEARCH
SYMMETRY
```

*Test command

Python3 wordSearchMaker.py 12 12 wordfile1.txt

*Test result

```
(base) n3-22-73:Desktop yenalee$ python3 wordSearchMaker.py 12 12 wordfile1.txt
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   |   |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+

Place the word 'ADMISSIBLE' in the grid starting at position (2,1) and proceeding in the direction [1,0].
Place the word 'AGENT' in the grid starting at position (9,7) and proceeding in the direction [-1,-1].
Place the word 'BACKTRACK' in the grid starting at position (4,1) and proceeding in the direction [1,0].
Place the word 'CANNIBAL' in the grid starting at position (10,3) and proceeding in the direction [1,0].
Place the word 'DEADEND' in the grid starting at position (8,11) and proceeding in the direction [0,-1].
Place the word 'GLOBAL' in the grid starting at position (0,0) and proceeding in the direction [1,0].
Place the word 'GRAPHSEARCH' in the grid starting at position (1,0) and proceeding in the direction [1,0].
Place the word 'HEURISTIC' in the grid starting at position (3,9) and proceeding in the direction [-1,0].
Place the word 'LISP' in the grid starting at position (5,0) and proceeding in the direction [1,1].
Place the word 'LOCAL' in the grid starting at position (5,10) and proceeding in the direction [-1,1].
Place the word 'MISSIONARY' in the grid starting at position (11,10) and proceeding in the direction [-1,0].
Place the word 'SEARCH' in the grid starting at position (4,0) and proceeding in the direction [1,1].
```

```
Grid:

+---+---+---+---+---+---+---+---+---+---+---+---+
| G | L | O | B | A | L |   |   |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
| G | R | A | P | H | S | E | A | R | C | H |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   | A | D | M | I | S | S | I | B | L | E | D |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   | C | I | T | S | I | R | U | E | H |   | N |
+---+---+---+---+---+---+---+---+---+---+---+---+
| S | B | A | C | K | T | R | A | C | K |   | E |
+---+---+---+---+---+---+---+---+---+---+---+---+
| L | E |   | T |   |   |   |   |   |   | L | D |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   | I | A |   | N |   |   |   |   | O |   | A |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   | S | R |   | E |   |   | C |   |   | E |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   | P | C |   | G | A |   |   |   | D |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   |   |   | H | L | A |   |   |   |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   |   |   | C | A | N | N | I | B | A | L |   |
+---+---+---+---+---+---+---+---+---+---+---+---+
|   | Y | R | A | N | O | I | S | S | I | M |   |
+---+---+---+---+---+---+---+---+---+---+---+---+


Words:

['ADMISSIBLE', 'AGENT', 'BACKTRACK', 'CANNIBAL', 'DEADEND', 'GLOBAL', 'GRAPHSEARCH', 'HEURISTIC', 'LISP', 'LOCAL'
, 'MISSIONARY', 'OPTIMUM', 'RATIONAL', 'SEARCH', 'SYMMETRY']
```