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GOALS:

"An extension of simple goal insistence (SGI) action planning, goal-oriented action planning (GOAP) builds plans based on the results of activities rather than merely responding to degrees of objective insistence. Make a GOAP simulation that shows how well the method works for thinking about the long-term impacts of actions (such as side effects and/or delays in time) and how it can be used to plan and behave wisely."

TECHNOLOGIES, TOOLS, AND RESOURCES USED: Tools: Python 3.12.0 ChatGPT. Retrieved from: <https://chat.openai.com/> Claude. Retrieved from <https://claude.ai/chats> Resources: Lab 05 - Graphs, Paths and Search Lab 07 - Goal Oriented Behaviour and SGI

TASKS UNDERTAKEN:

For this lab, I made changes to the "gob_simple.py" file and created a new file named "gob_step2.py" to illustrate two different scenarios: one where Simple Goal-Oriented Behavior (SGOB) is effective and another where it falls short.

The scenario provided in "gob_simple.py" is successfully addressed using SGOB. However, when executing the code in "gob_step2.py", the program enters an infinite loop because it cannot find a state that fulfills all three objectives simultaneously: "consume food", "stay healthy", and "be productive". The objectives are defined as follows:

```
"objectives = {  
    'stay healthy': 5,  
    'consume food': 3,  
    'be productive': 2  
}"
```

For Step 2, I have created the following activities:

```
"activities = {  
    'consume junk food': {'consume food': -2, 'stay healthy': +3, 'be productive': +1},  
    'work in coal mine': {'consume food': 6, 'stay healthy': +2, 'be productive': -3},  
    'consume nutritious food': {'consume food': -4, 'stay healthy': -3, 'be productive': +3},  
    'work as kitchen assistant with complimentary meal': {'consume food': -1, 'stay  
healthy': -1, 'be productive': -1}  
}"
```

The reason SGOB struggles in this scenario is that the objectives are impacted in opposing ways by the activities, with the exception of the last activity. For example, "consume junk food" positively affects the "consume food" objective but negatively affects the "stay healthy" and "be productive" objectives. As a result, the agent may choose an action that advances one objective while hindering others.

SGOB selects an activity based on its immediate benefit for the most pressing objective, which is the attribute that needs to be minimized the most at the present moment. It does not consider the overall impact on all objectives or the long-term consequences. For instance, repeatedly selecting "work in coal mine" might satisfy the "be productive" objective but would eventually worsen the "consume food" and "stay healthy" objectives significantly.

In reality, the only way to succeed is to consistently choose the last activity, 'work as kitchen assistant with complimentary meal'. However, SGOB only focuses on the most urgent objective and the most beneficial activity for that objective in each iteration. It is unlikely to select an activity where the change value is -1 for all objectives. In essence, it only considers the current behavior (state) in each individual iteration.