**CS571**

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**HW8**

**Write the PROLOG code for the farmer, wolf, goat, and cabbage problem as follows:**

**A farmer with his wolf, goat, and cabbage come to the edge of a river they wish to cross. There is a boat at the river’s edge, but, of course, only the farmer can row. The boat also can carry only two things (including the rower) at a time. If the wolf is ever left alone with the goat, the wolf will eat the goat; similarly, if the goat is left alone with the cabbage, the goat will eat the cabbage. Devise a sequence of crossings of the river so that all four characters arrive safely on the other side of the river.**

**a. Execute this code and draw a graph of the search space.**

**b. Alter the rule ordering to produce alternative solution paths.  Move first rule of taking wolf to be the fourth.**

**Answer the above question, write the answer in a word processor. Then, use your Prolog program to show how the farmer, the wolf, the goat, and the cabbage can cross the river safely and put the script of testing your query in a text file.**

Answer:

Following is the graph of the search space, we want to let all four characters cross the river from side ***a*** to side ***b*** safely, which means neither wolf and goat nor goat and cabbage can stay together without farmer.

The red cut means this path is unsafe, which means wolf and goat or goat and cabbage stay on same side without farmer.

The blue path is for question a, the farmer takes wolf before cabbage;

The green path is for question b, the farmer takes cabbage before wolf.

F: farmer; W: wolf; G: goat; C: cabbage

In [a,a,a,a], ***a*** or ***b*** is for the side of each character, for example, [b,a,a,a] means farmer is on side ***b***, others are on side ***a*.**

Path 2: take cabbage first

Path 1: take wolf first

[a, b, a, b]

[F, W, G, C]

[b, b, b, b]

[F, W, G, C]

[b, b, a, b]

[F, W, G, C]

[b, b, a, a]

[F, W, G, C]

[b, a, a, b]

[F, W, G, C]

[a, a, b, b]

[F, W, G, C]

[a, a, a, b]

[F, W, G, C]

[a, b, b, a]

[F, W, G, C]

[a, b, a, a]

[F, W, G, C]

[b, b, b, a]

[F, W, G, C]

[b, a, b, b]

[F, W, G, C]

Side: [a, a, a, a]

Char: [F, W, G, C]

[b, a, a, a]

[F, W, G, C]

[b, b, a, a]

[F, W, G, C]

[b, a, b, a]

[F, W, G, C]

[b, a, a, b]

[F, W, G, C]

[a, a, b, a]

[F, W, G, C]