

Homework 1

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1 TWO-STATE SEMANTIC NETWORK

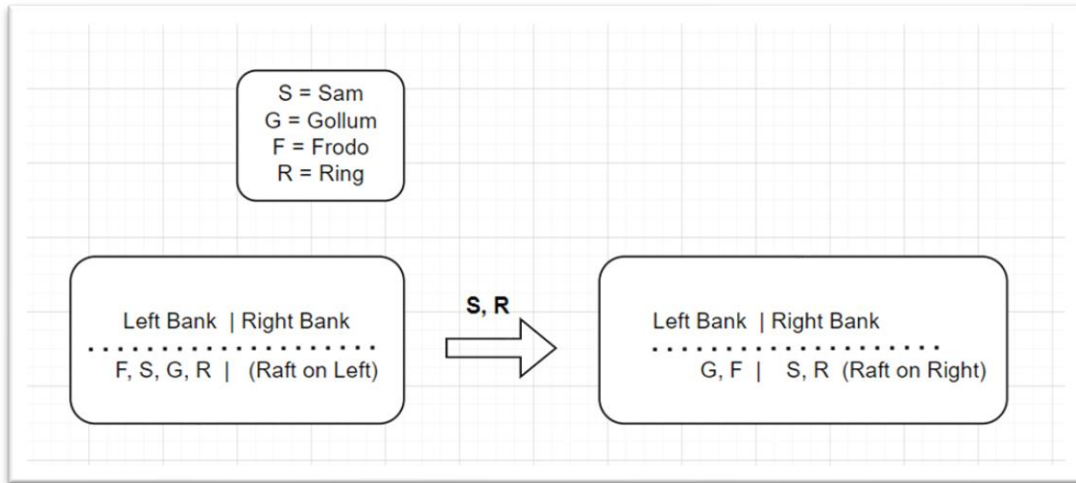


Figure 1—One semantic network representing two states with a transition between them. Initial state to next state.

Figure 1 above shows a semantic network consisting of the initial problem state and a valid state that follows it. In the example above, we have Frodo (F), Sam (S), Gollum (G), and the Ring (R) on the left bank along with the raft. The transition to the next state shows S and R moving to the right bank leaving G and F on the left bank.

2 COMPLETED SEMANTIC NETWORK USING GENERATE AND TEST

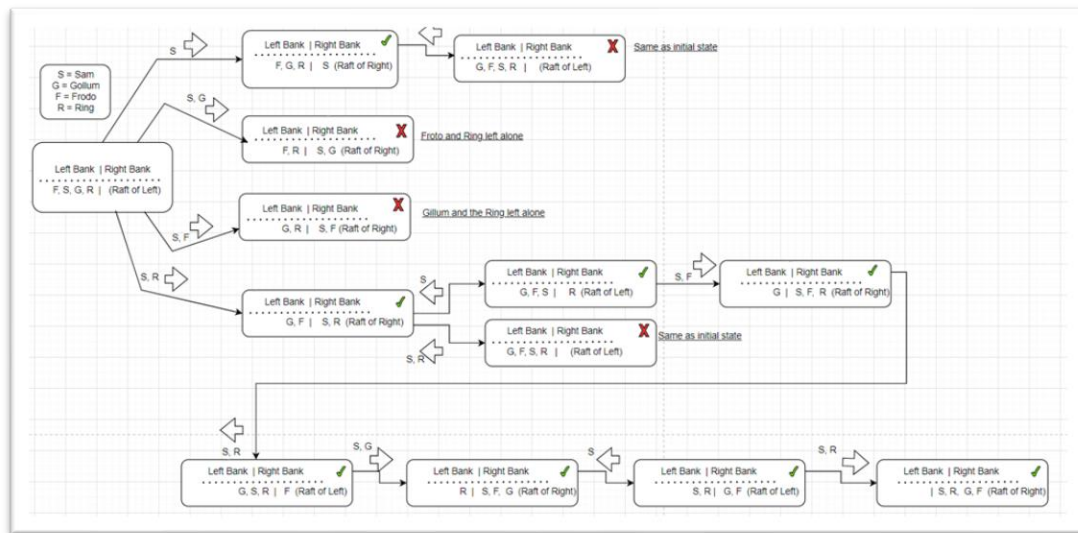


Figure 2—Completed semantic network using generate and test method. Initial state through completion

Figure 2 above is a visual representation of a semantic network that solves the problem of getting Frodo, Sam, Gollum, and the Ring across the river while adhering to the provided constraints. It begins with the initial state, where all four entities are located on the left bank along with the raft. From this starting point, the generate and test method explores possible transitions in which Sam either steers the raft alone or with one of the others, ensuring no violations of the rules regarding the Ring. The valid transitions are shown in the diagram with arrows leading to states marked with a green check, indicating that these states are valid and compliant with the constraints.

Several valid transitions are explored, such as Sam taking the Ring across or traveling alone, followed by returning to the left bank to continue moving characters. These transitions ensure that neither Frodo nor Gollum is left alone with the Ring. Failed transitions, marked with a red X occur when either Frodo or Gollum is left alone with the Ring. For example, states where Frodo is left with the Ring while Sam and Gollum cross, or where Gollum is left with the Ring, are correctly identified as invalid. Additionally, the network highlights states that revisit the same configuration as earlier states, marking them as "Same

as initial state" and preventing further exploration from these points to avoid redundant cycles.

In this process, the tester successfully identifies failed states, including those where Frodo or Gollum are left alone with the Ring, which are not allowed under the rules. The tester also marks revisited states, such as when characters are moved back and forth without progress, ensuring that the solution remains efficient. The semantic network ultimately explores all possible valid and invalid states and transitions, ruling out those that lead to failure, while successfully finding the solution path that brings all characters and the Ring to the right bank without breaking the rules.