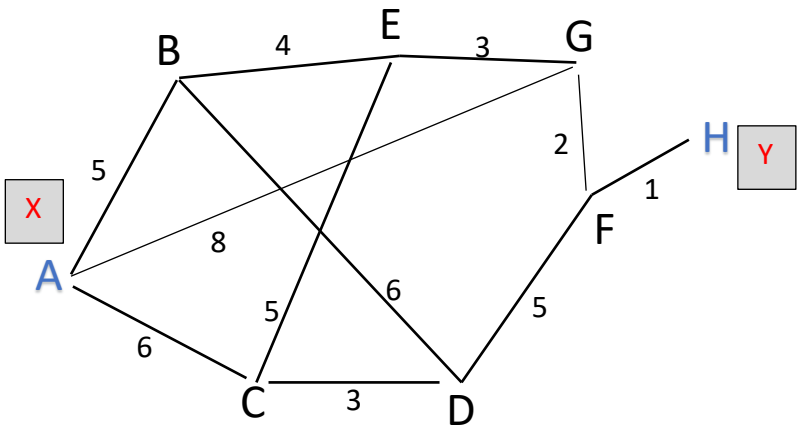
Artificial Intelligence – Spring 2022 – Assignment 1



Suppose that we have a map consisting of cities A, B, …, H with the road and distances between cities (whenever they are connected) as shown in the above figure. Two agents, one (X) is at A and another (Y) is at H. They want to meet each other at some cities. Assume that the agents can only move to the neighboring cities, one at a time. At every step, each has to move to a neighboring city, i.e., they cannot just stay in one place to wait for the other agent go come. Furthermore, we assume that each move taking one time step, i.e., the distance does not affect how fast/slow an agent moves.

As an example, they can meet each other after two steps: X moves to B then D and Y moves to H then D. However, if X moves to G and Y moves to F in the first steps, then they cannot meet each other after two steps because X must move to A, E, or F and Y must move to G, D, or H.

Formulate the problem as a search problem by answer the following questions:

a. What is the set of possible states of the search problem? It might be good to introduce some formal notation, so you can use for the next items. Give one sentence description of what you mean to describe with a state.
b. What are the transitions between states? Provide one sentence justification!
c. What is the set of initial states?
d. What is the set of goal states?
e. How many states does the search problem have? **Notice that this depends on how you define the state**!