COMS 4701 - Homework 1 - Conceptual

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Question 1

Insert answer for question 1 here.

(a) Robotics, Computer vision, spoken language processing, Planning

(b) P: Battery life, security, conversational, efficiency, time, comfort, mobility, emotional intelligence

E: Wood floors and/or carpet, doors, walls, tables, chairs, obstacles, home appliances, locks

A: Wheels, arm like attachments, signals, speakers, microphones, phone like integration

S: Cameras, sensors (home appliances, door locks, and elder behaviors), microphones, home gps, infrared wall sensors

(c) Environment:

1. Partially observable since E-buddy relies on cameras and sensors but cannot always capture all necessary information in a given time
2. All elders in a elder homes as a whole and individuals, any support pets, family, guests in home, caregivers
3. Stochastic since the e-buddy cannot everything due to fast changes in the environment like sudden falls, unexpected health emergencies, and elders behaviors
4. Mostly continuous since the e-buddy is required to keep a continuous knowledge of of the environment for better preparation for changes and tasks

(d) Alert elder and family when something falls (not only when the elder falls) to improve the help with elderly mobility, management of schedules and appointments (family outings, walks, doctors, dentist), incorporate a wearable device for the elder to get faster and more reliable feedback on elder health and emotional status.

Question 2

Insert answer for question 2 here.

a) Provide a general mathematical formalization of the states in this problem. Feel free to invent as many variables as you need.

State=(x,y, F)

We let (x,y) represent the coordinates of Maya's current position on the N×M grid and F={f1,f2,...,fk_ } where each f_i represents a flower. For each flower f_i, it has two possible states: f_i=0 (nectar is uneaten) or f_i=1 (nectar is eaten).

b) What is the maximum branching factor?

Since there are 5 possible actions Maya can take, the maximum branching factor = 5

c) What is the goal test? A sentence is enough but be specific.

The goal test is when Maya has visited all k flowers, meaning every flower in the vector F is 1 (nectar eaten)

d) What is a reasonable upper bound on the size of the state space for an N × M garden?

A reasonable upper bound on the size of the state space for an NxM garden is N x M x 2^k since may can be at any position in the garden and there are 2^k possible combinations for the flower states such that k is the number of flowers in the garden uneaten

e) Is the heuristic h(s) = 0 for all s an admissible heuristic?

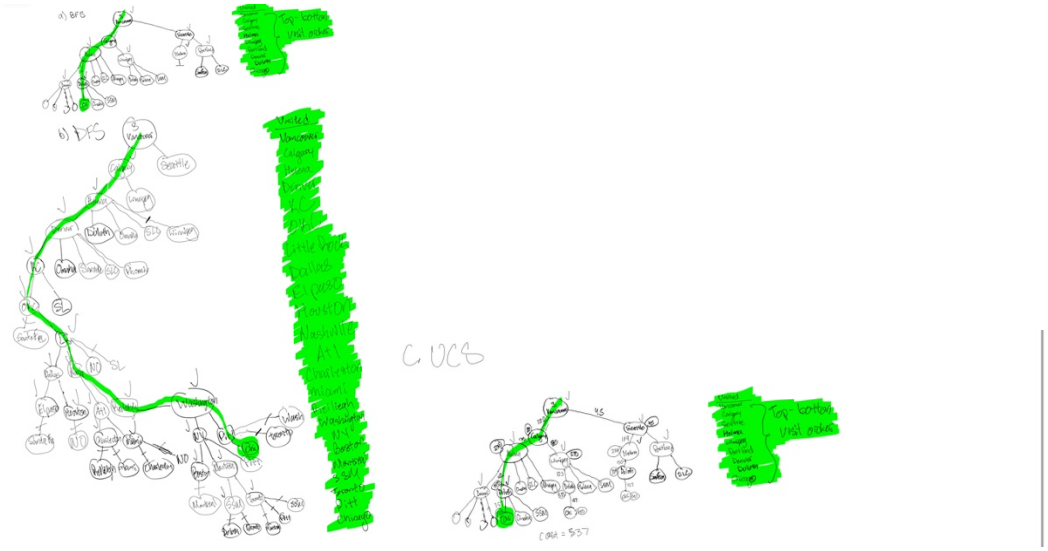
Yes, the heuristic h(s)=0 is admissible because it does not overestimate the cost however it underestimates the cost to reach the goal

f) Is the heuristic h(s) = 1 for all s an admissible heuristic?

No, the heuristic h(s)=1 is not admissible because it may overestimate the cost to the goal

Question 3

Insert answer for question 3 here.



a) BFS

Cities Visited: Vancouver, Calgary, Seattle, Helena, Winnipeg, Portland, Denver, Duluth, Chicago

Resulting Path: Vancouver, Calgary, Helena, Duluth, Chicago

b) DFS

Cities Visited: Vancouver, Calgary, Helena, Denver, Kansas City, Oklahoma City, Little Rock, Dallas, El Paso, Houston, Nashville, Atlanta, Charleston, Miami, Raleigh, Washington, New York, Boston, Montreal, Sault Ste Marie, Toronto, Pittsburg, Chicago

Resulting Path: Vancouver, Calgary, Helena, Denver, Kansas City, Oklahoma City, Little Rock, Nashville, Raleigh, Washington, Pittsburg, Chicago

c) UCS

Cities Visited: Vancouver, Calgary, Seattle, Helena, Winnipeg, Portland, Denver, Duluth, Chicago

Resulting Path: Vancouver, Calgary, Helena, Duluth, Chicago

Question 4

Insert answer for question 4 here.