345 Ludic Computing

Tutorial 4

Steering & Pathfinding

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Question 1

An agent of unit mass is controlled by a Pursue behaviour with $t_{pred} = |\mathbf{q} - \mathbf{p}| / |\mathbf{v}|$ and $t_{lim} = 3$. It has velocity (1,1) at position (4,3) at t = 0. It has a max. speed of 4 and no max. force. The moving target is at (7,6) with a constant velocity (2,0).

a) In general, why do we calculate t_{pred}?

b) Under what (maybe false) assumptions does t_{pred} = time to target?

c) Calculate the force on the agent at t = 0

d) What will the agent and target's positions be after $\Delta t = 0.5$?

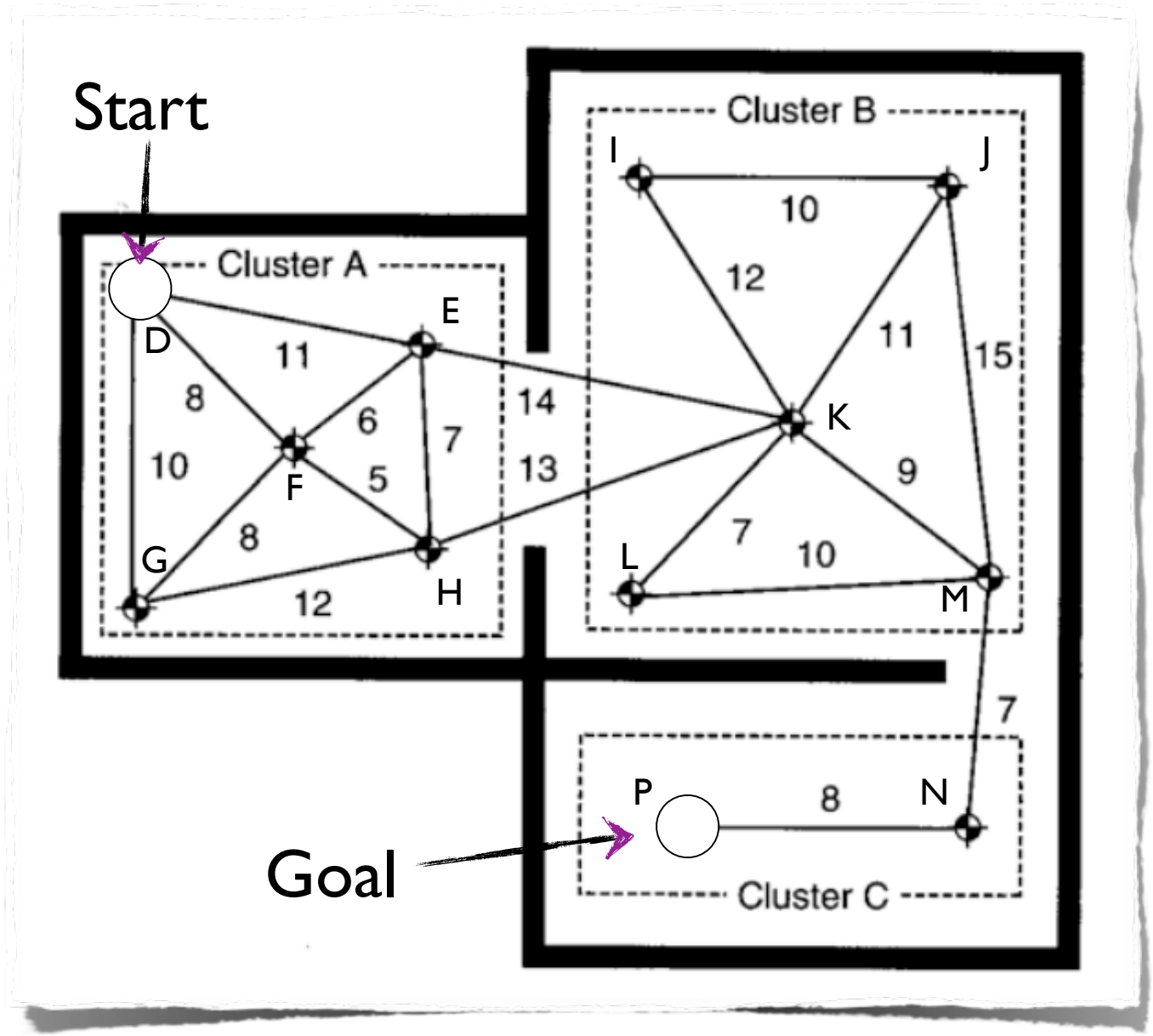
Question 2

On the following navgraph, find a path from D to P using the "estimated straight line distance" heuristic (see table) and...

a) A*

b) HPA*

And c) Which search method expands more nodes? What will happen if we add more rooms between the start and goal?


Start
Cluster A
Cluster B
Cluster C
D
E
F
G
H
I
J
K
L
M
N
P
Goal
11
8
6
7
10
5
8
12
14
13
10
12
11
15
9
7
10
7
8

Estimated distances

	D	E	F	G	H	I	J	K	L	M	N	P
P	28	21	21	23	14	25	26	16	8	15	8	0
N	36	27	29	32	23	27	22	16	15	7	0	
M	33	22	26	31	21	20	15	9	10	0		
L	22	11	13	19	7	15	18	7	0			
K	25	14	19	25	13	12	11	0				
J	30	21	26	33	25	10	0					
I	20	9	16	25	15	0						
H	13	7	5	12	0							
G	10	14	8	0								
F	8	6	0									
E	11	0										
D	0											

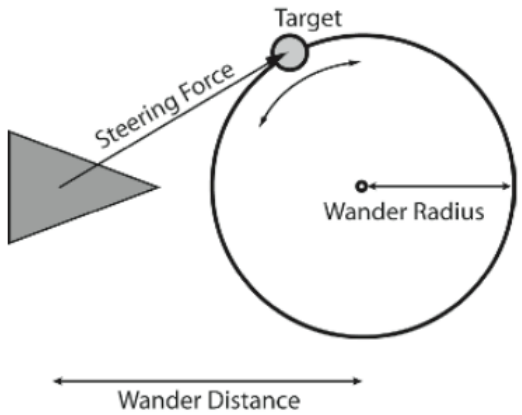
Question 3

a) How many bytes would it take to store the entries for a 'next node' look-up table for Q2's navigation graph? (with a constant number of bits per node)

b) How many if we use a next edge table instead?

c) How many for an edge look-up table for the HPA* abstract graph, and separate tables for the 3 clusters?

Question 4

The Wander steering behaviour is parameterised by the wander radius and distance, and the target jitter.

For each parameter, what effect does increasing it have on the movement of the agent?