Forward Planning Agent Project

The following problems:

1. Air Cargo Problem 1
2. Air Cargo Problem 2
3. Air Cargo Problem 3
4. Air Cargo Problem 4

are tested on the following algorithms:

1. breadth_first_search
2. depth_first_graph_search
3. uniform_cost_search
4. greedy_best_first_graph_search h_unmet_goals
5. greedy_best_first_graph_search h_pg_levelsum
6. greedy_best_first_graph_search h_pg_maxlevel
7. greedy_best_first_graph_search h_pg_setlevel
8. astar_search h_unmet_goals
9. astar_search h_pg_levelsum
10. astar_search h_pg_maxlevel
11. astar_search h_pg_setlevel

The required results are synthesized in the following tables:

#Espansions

	actions	**s1**	**s2**	**s3**	**s4**	**s5**	**s6**	**s7**	**s8**	**s9**	**s10**	**s11**
p1	*20*	43	21	60	7	6	6	6	50	28	43	33
p2	*72*	3343	624	5154	17	9	27	9	2467	357	2887	1037
p3	*88*	14663			25	14			7388	369		
p4	*104*	99736			29	17			34330	1208		

The number of expansions grows exponentially with the size of the problem in algorithms 1 3 and 8 to 11, while for the other problems the trend seems to be closer to linear.

#Search time

	actions	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
p1	*20*	0.003	0.001	0.004	0.001	0.22	0.16	0.28	0.004	0.571	0.576	0.667
p2	*72*	0.924	1.37	1.54	0.009	5.07	10.22	7.01	1.03	145.4	872.1	700.2
p3	*88*	5.29			0.02	12.22			4.44	230.6		
p4	*104*	45.78			0.027	21.6			27.52	1256		

The search time grows somewhat quadratic-ally for algorithms 4 to 7, while for the remaining ones it seems to grow exponentially

#Plan length

	actions	s1	s2	s3	s4	s5	s6	s7	s8	s9	s10	s11
p1	*20*	6	20	6	6	6	6	6	6	6	6	6
p2	*72*	9	619	9	9	9	9	9	9	9	9	9
p3	*88*	12			15	14			12	12		
p4	*104*	14			18	17			14	15		

1)Which algorithm or algorithms would be most appropriate for planning in a very restricted domain (i.e., one that has only a few actions) and needs to operate in real time?

Algorithms 1, 2 and 4 (especially) appear to be extremely suitable for this purpose, since they require a very limited search time in small envs.

2)Which algorithm or algorithms would be most appropriate for planning in very large domains (e.g., planning delivery routes for all UPS drivers in the U.S. on a given day)

Tested algorithms 1 and 8 (especially) on problems 3 and 4 assure shorter plans in reasonable search time.

3)Which algorithm or algorithms would be most appropriate for planning problems where it is important to find only optimal plans?

Again tested algorithms 1, 8 on problems 3 and 4 assure optimal plans