

*mas, em HDDL*

- Breno L. – 202017343
- Breno S. – 202017540
- Henderson – 222006795
- Yogi – 232014576

```
; Snake by Mau Magnaguagno
(define (domain snake)
  (:requirements :hierarchy :typing :equality :negative-preconditions
    :method-preconditions :universal-preconditions)

  (:types snake location)

  (:predicates
    (occupied ?pos - location)
    (adjacent ?pos1 ?pos2 - location)
    (head ?snake - snake ?headpos - location)
    (connected ?snake - snake ?bodypos1 ?bodypos2 - location)
    (tail ?snake - snake ?tailpos - location)
    (mouse-at ?foodpos - location)
  )

  (:task hunt :parameters ())
  (:task move :parameters (?snake - snake ?snakepos ?goalpos - location)))
```

```
(:objects
  viper - snake
  px0y0 px1y0 px2y0
  px0y1 px1y1 px2y1
  px0y2 px1y2 px2y2 - location
)
```

```
(:htn :subtasks (hunt))
```

```
(:init
  (head viper px2y2)
  (connected viper px2y2 px2y1)
  (tail viper px2y1)
```

```
(mouse-at px0y0)
```

```
(occupied px0y0)
```

```
(occupied px2y1)
```

```
(occupied px2y2)
```

```
(adjacent px0y0 px1y0) (adjacent px1y0 px0y0) (adjacent px1y0 px2y0) (adjacent px2y0 px1y0)
```

```
(adjacent px0y1 px1y1) (adjacent px1y1 px0y1) (adjacent px1y1 px2y1) (adjacent px2y1 px1y1)
```

```
(adjacent px0y2 px1y2) (adjacent px1y2 px0y2) (adjacent px1y2 px2y2) (adjacent px2y2 px1y2)
```

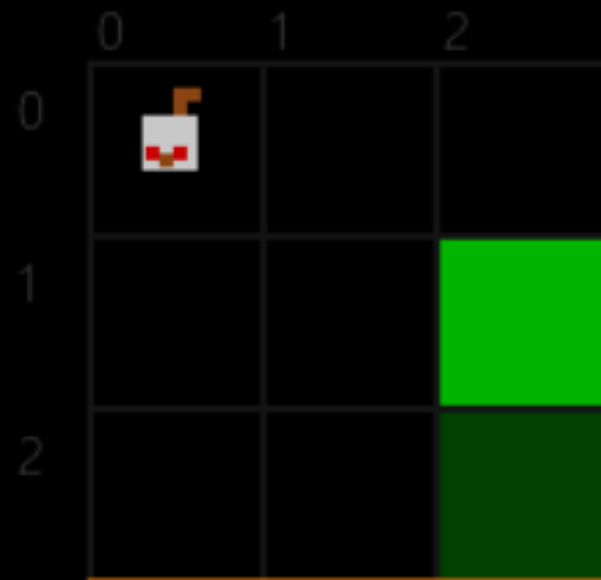
```
(adjacent px0y0 px0y1) (adjacent px0y1 px0y0) (adjacent px1y0 px1y1) (adjacent px1y1 px1y0)
```

```
(adjacent px2y0 px2y1) (adjacent px2y1 px2y0)
```

```
(adjacent px0y1 px0y2) (adjacent px0y2 px0y1) (adjacent px1y1 px1y2) (adjacent px1y2 px1y1)
```

```
(adjacent px2y1 px2y2) (adjacent px2y2 px2y1)
```

```
)
```



```
(:method hunt_all
  :parameters (?snake - snake ?foodpos ?snakepos ?pos1 - location)
  :task (hunt)
  :precondition (and
    (mouse-at ?foodpos)
    (head ?snake ?snakepos)
    (adjacent ?foodpos ?pos1)
  )
  :ordered-subtasks (and
    (move ?snake ?snakepos ?pos1)
    (strike ?snake ?pos1 ?Sfoodpos)
    (hunt)
  )
)
```

```
(:method hunt_done
  :parameters ()
  :task (hunt)
  :precondition (forall (?pos - location) (not (mouse-at ?pos)))
  :subtasks ()
)
```

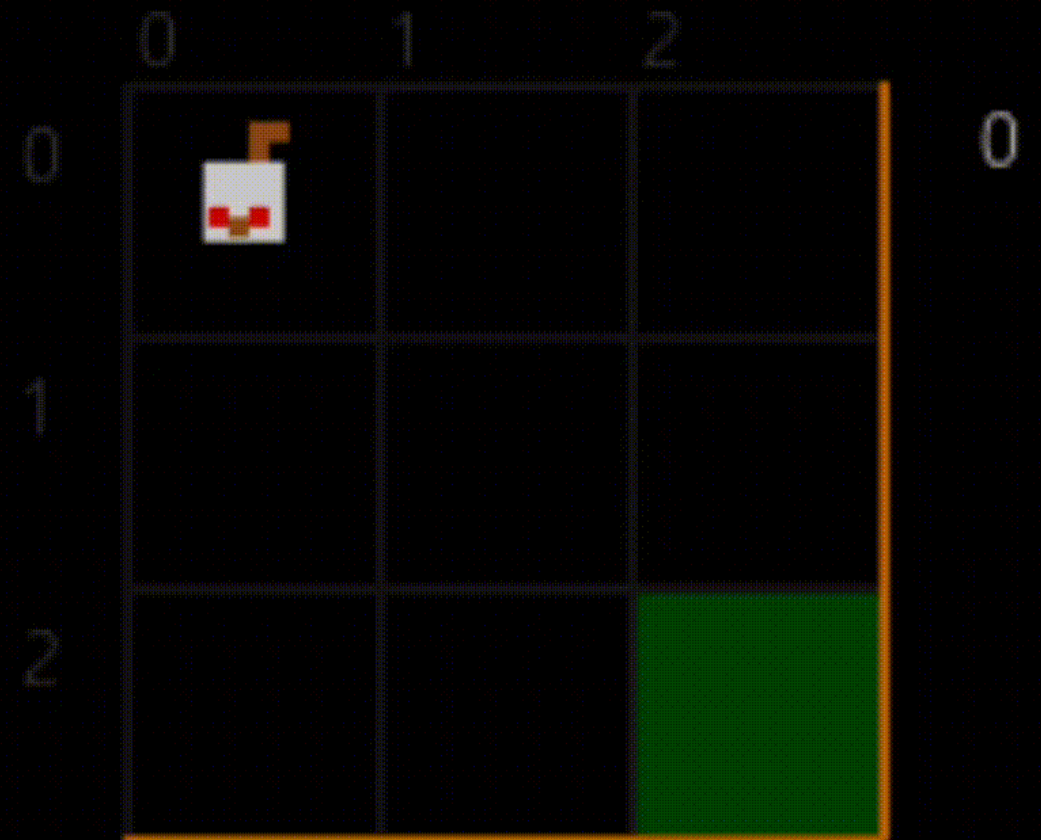
```
(:method move-base
  :parameters (?snake - snake ?snakepos ?goalpos - location)
  :task (move ?snake ?snakepos ?goalpos)
  :precondition (= ?snakepos ?goalpos)
  :subtasks ()
)

(:method move-long-snake
  :parameters (?snake - snake ?snakepos ?goalpos ?pos2 ?bodypos ?tailpos - location)
  :task (move ?snake ?snakepos ?goalpos)
  :precondition (and (adjacent ?pos2 ?snakepos) (not (occupied ?pos2)) (connected ?snake ?bodypos ?
tailpos) (tail ?snake ?tailpos))
  :ordered-subtasks (and
    (move-long ?snake ?pos2 ?snakepos ?bodypos ?tailpos)
    (move ?snake ?pos2 ?goalpos)
  )
)

(:method move-short-snake
  :parameters (?snake - snake ?snakepos ?goalpos ?pos2 - location)
  :task (move ?snake ?snakepos ?goalpos)
  :precondition (and (adjacent ?pos2 ?snakepos) (not (occupied ?pos2)) (tail ?snake ?snakepos))
  :ordered-subtasks (and
    (move-short ?snake ?pos2 ?snakepos)
    (move ?snake ?pos2 ?goalpos)
  )
)
```

```
(:action move-short
  :parameters (?snake - snake ?nextpos ?snakepos - location)
  :precondition (and
    (head ?snake ?snakepos)
    (tail ?snake ?snakepos)
    (adjacent ?nextpos ?snakepos)
    (not (occupied ?nextpos)))
  )
  :effect (and
    (not (head ?snake ?snakepos))
    (not (tail ?snake ?snakepos))
    (occupied ?nextpos)
    (head ?snake ?nextpos)
    (tail ?snake ?nextpos)
    (not (occupied ?snakepos))
  )
)
```

move-short viper px2y1 px2y2



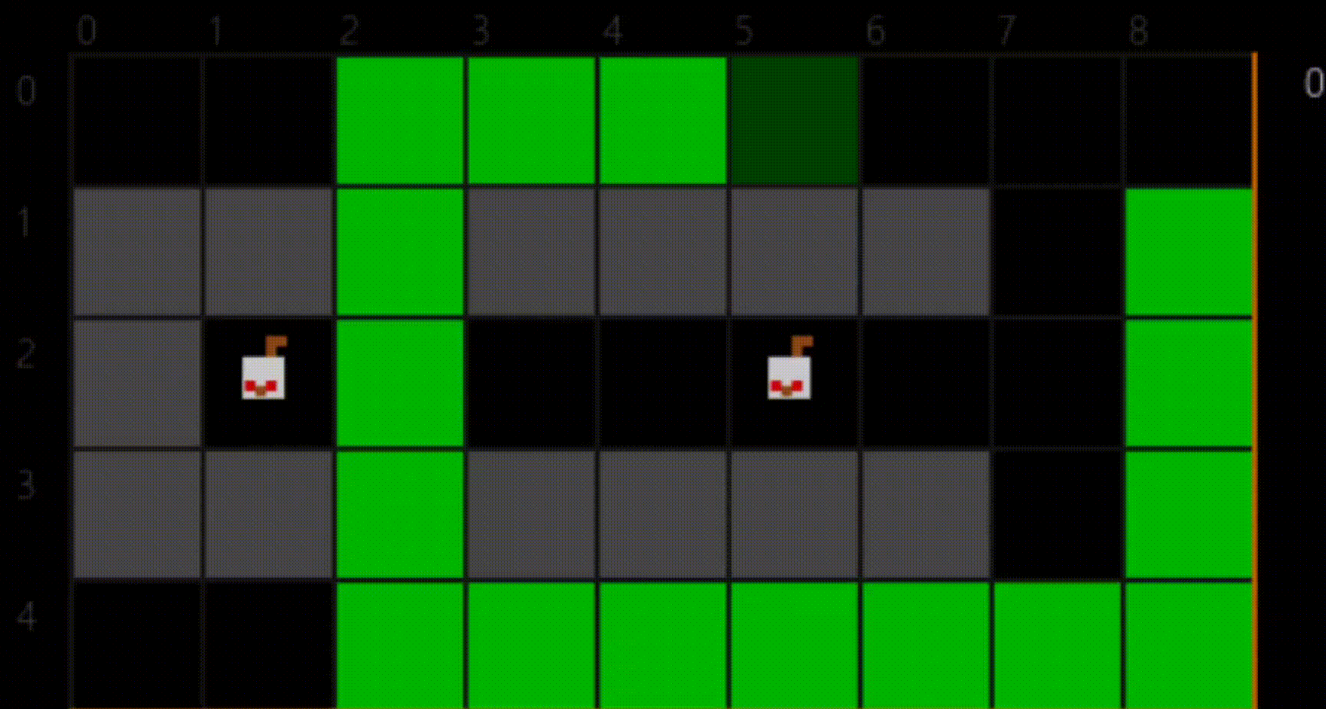


```

(:action move-long
  :parameters (?snake - snake ?nextpos ?headpos ?bodypos ?tailpos - location)
  :precondition (and
    (head ?snake ?headpos)
    (connected ?snake ?bodypos ?tailpos)
    (tail ?snake ?tailpos)
    (adjacent ?nextpos ?headpos)
    (adjacent ?bodypos ?tailpos)
    (not (occupied ?nextpos))
    (not (= ?bodypos ?nextpos))
    (not (= ?tailpos ?nextpos))
    (not (= ?headpos ?tailpos))
  )
  :effect (and
    (not (head ?snake ?headpos))
    (head ?snake ?nextpos)
    (not (tail ?snake ?tailpos))
    (tail ?snake ?bodypos)
    (not (connected ?snake ?bodypos ?tailpos))
    (connected ?snake ?nextpos ?headpos)
    (occupied ?nextpos)
    (not (occupied ?tailpos))
  )
)
)

```

move-long viper px6y0 px5y0 px8y2 px8y1

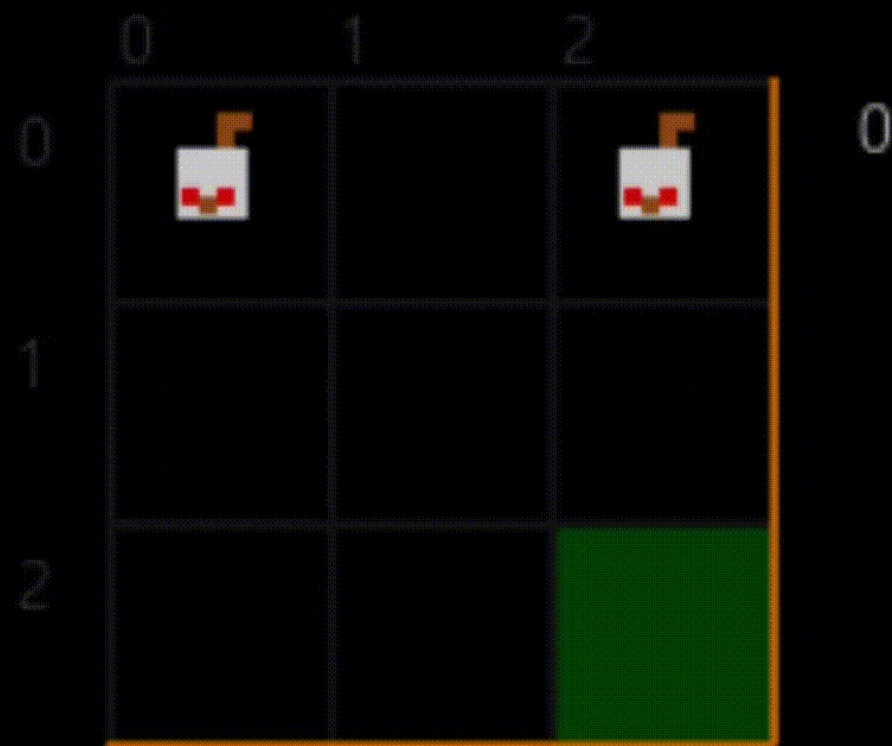


```

(:action strike
  :parameters (?snake - snake ?headpos ?foodpos - location)
  :precondition (and
    (head ?snake ?headpos)
    (mouse-at ?foodpos)
    (adjacent ?foodpos ?headpos)
    (not (= ?headpos ?foodpos)))
  )
  :effect (and
    (not (mouse-at ?foodpos))
    (not (head ?snake ?headpos))
    (connected ?snake ?foodpos ?headpos)
    (head ?snake ?foodpos)
  )
)

```

move-short viper px2y1 px2y2





PandaPI (HDDL)			M -S 1 -P 0 (PDDL)			seq-opt-fdss-2 (PDDL)		
Problema	Tempo (s)	Ações	Tempo (s)	Ações	Tempo (s)	Ações		
1	0,08	4	0,01	4	0,15	4		
2	0,07	4	0,01	4	0,14	4		
3	0,07	4	0,01	4	0,13	4		
4	0,29	2	0,31	2	0,96	2		
5	0,15	10	0,29	10	0,31	10		
6	0,32	12	0,22	11	0,6	11		
7	0,66	12	3,97	12	0,97	12		
8	0,4	14	1,37	12	0,57	12		
9	0,4	8	0,29	8	0,85	8		
10	0,34	20	0,92	12	0,32	12		
11	0,18	9	2,76	10	0,3	9		
12	0,2	12	0,76	12	0,36	10		
13	1,51	16	5,51	16	2,18	16		
14	3,91	19	62,46	15	4,54	15		
15	14,53	20	32,51	20	18,06	20		
16	1,24	19	1,75	16	1,24	16		
17	1,39	16	22,89	14	2,11	14		
18	7,69	15	18,73	15	4,28	15		
19	0,34	11	0,15	11	0,97	11		
20	0,46	16	1,65	16	3,73	16		
Total	34,23	243	156,57	224	42,77	221		

		HyperTensioN	Lilotane	PDDL4J-TO	PDDL4J-PO	HPDL	pyHiPOP
AssemblyHierarchical	30	3	<b>5</b>	2	1	0	0.5
Barman-BDI	20	<b>20</b>	16	11	5.5	10	0
Blocksworld-GTOHP	30	16	<b>22.1</b>	16	8.5	6.6	0.5
Blocksworld-HPDDL	30	<b>30</b>	1	0	0	0	0
Childsnack	30	<b>30</b>	29	20.9	10.5	11	0
Depots	30	<b>24</b>	23.4	23	11.4	11	0
Elevator-Learned	147	<b>147</b>	<b>147</b>	2	1	5.5	1
Entertainment	12	0	<b>4.6</b>	<b>4.6</b>	1.5	0	0.5
Factories-simple	20	3	<b>4</b>	0	0	0	0.5
Freecell-Learned	60	0	<b>7.7</b>	0	0	0	0
Hiking	30	<b>25</b>	21.3	17	7.3	0	0
Logistics-Learned	80	22	<b>43.2</b>	0	0	0	0
Minecraft-Player	20	<b>5</b>	1	1	0.5	1.5	0
Minecraft-Regular	59	<b>57.1</b>	29.2	23	11.5	17.5	0
Monroe-Fully-Observable	20	0	<b>20</b>	<b>20</b>	9.9	3.2	0
Monroe-Partially-Observable	20	0	<b>20</b>	1	0.5	0	0
Multiarm-Blocksworld	74	<b>8</b>	4	0	0	0.5	0
Robot	20	<b>20</b>	11	6	3	0	0.5
Rover-GTOHP	30	<b>30</b>	21.3	27.5	12.8	15	3
Satellite-GTOHP	20	<b>20</b>	15	<b>20</b>	5	0	3.5
Snake	20	<b>20</b>	17.1	<b>20</b>	10	3.5	1
Towers	20	<b>17</b>	10	16	7.5	5.5	1
Transport	40	<b>40</b>	35	33.2	16.5	0.5	8.6
Woodworking	30	7	<b>30</b>	6	3	1.5	2
	892	<b>544.1</b>	537.9	270.2	126.9	92.8	22.5

Snake

20

**20**  
HyperTensionN

17.1  
Lilotane

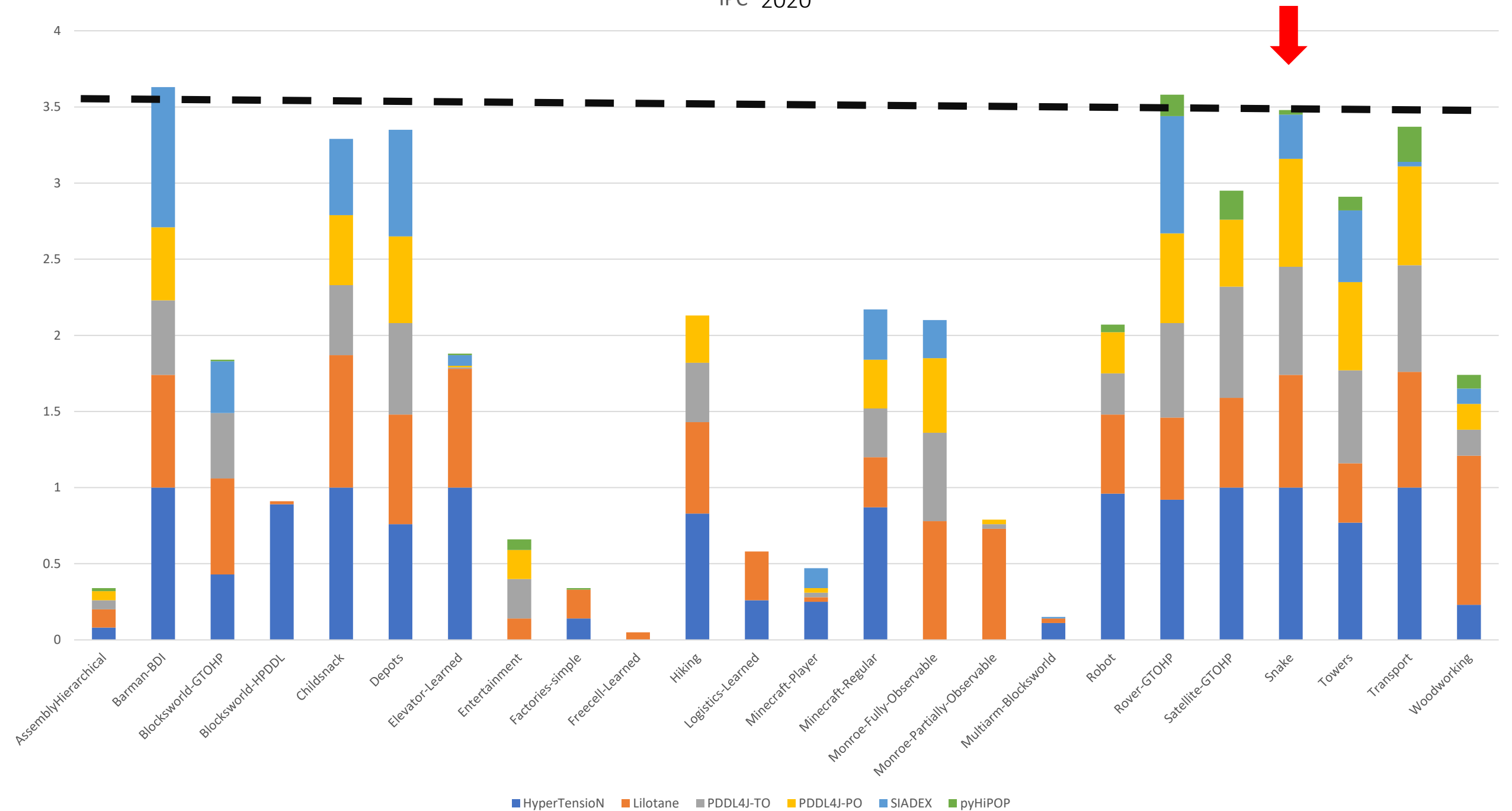
**20**  
PDDL4J-TO

10  
PDDL4J-PO

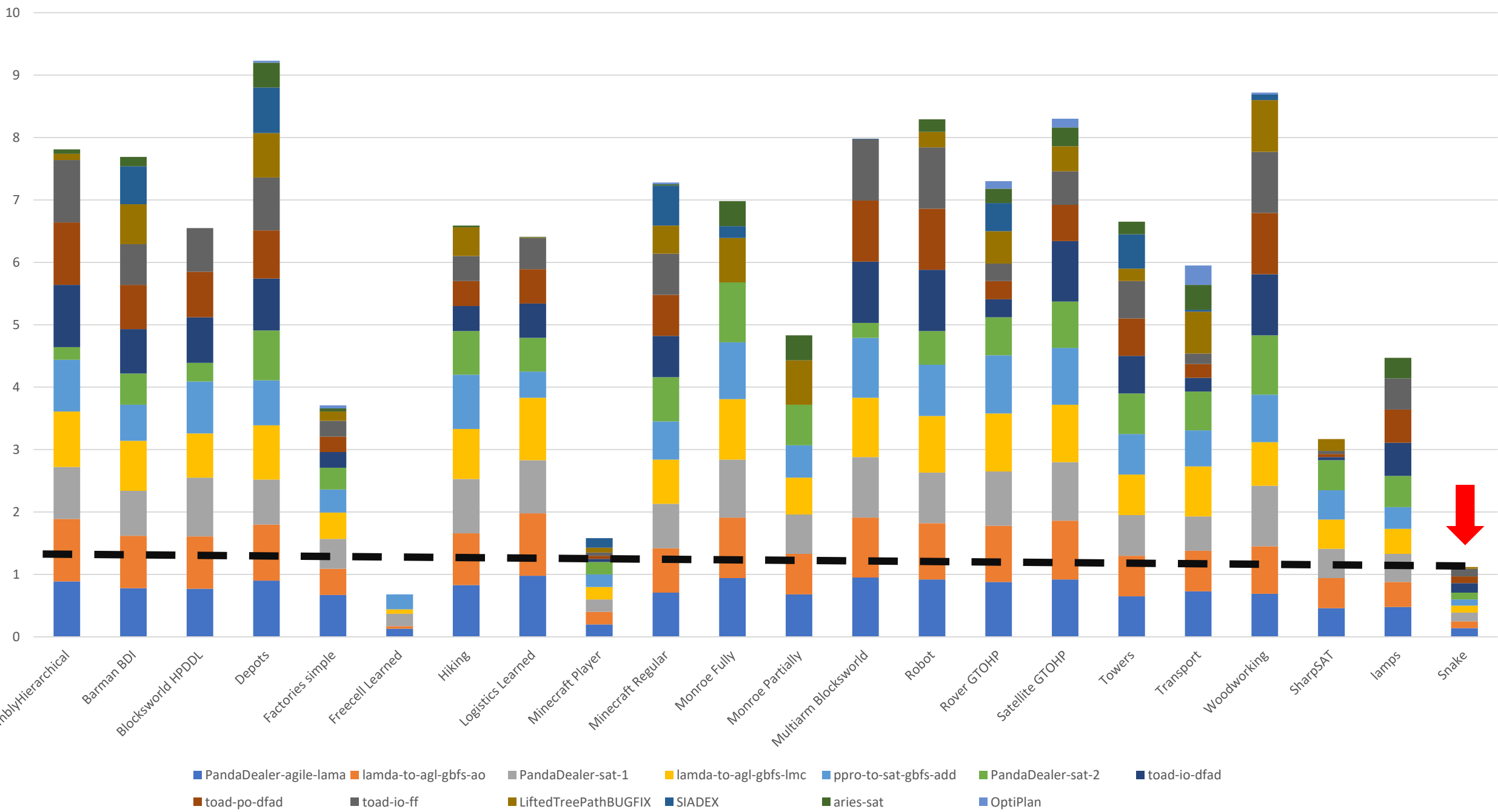
3.5  
HPDL

1  
pyHiPOP

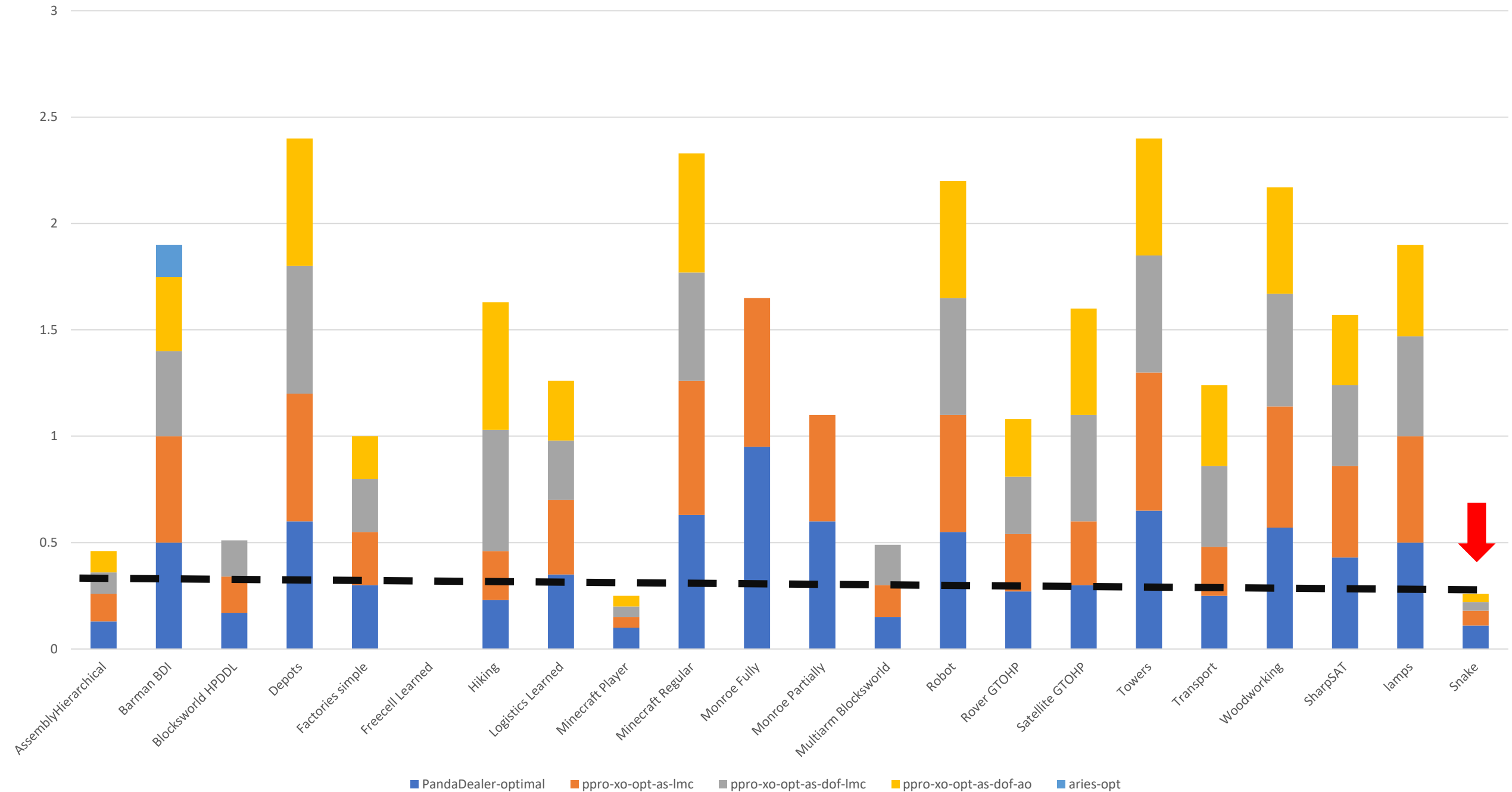
# IPC 2020



# IPC 2023 Satisficing



# IPC 2023 Optimal

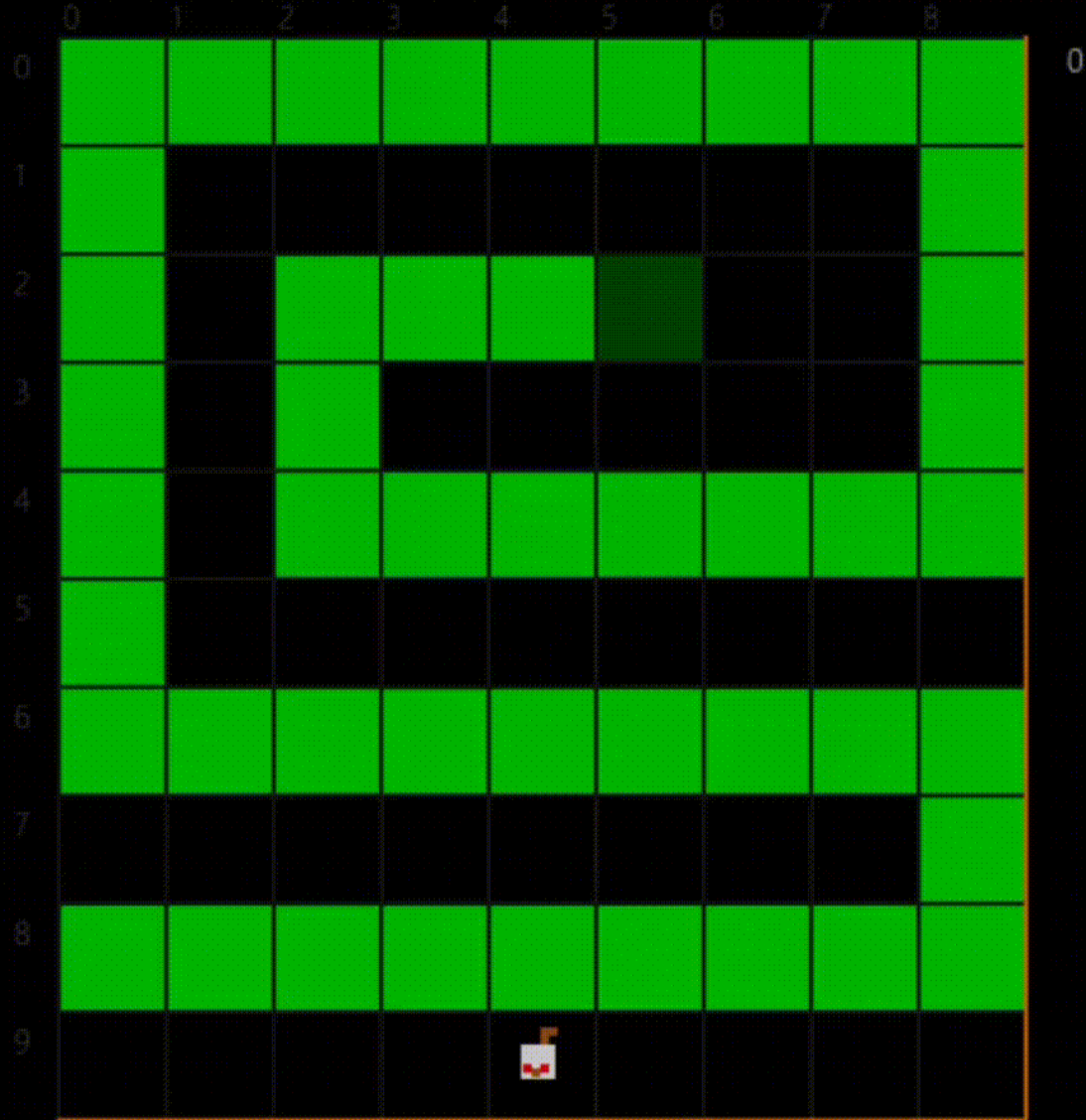




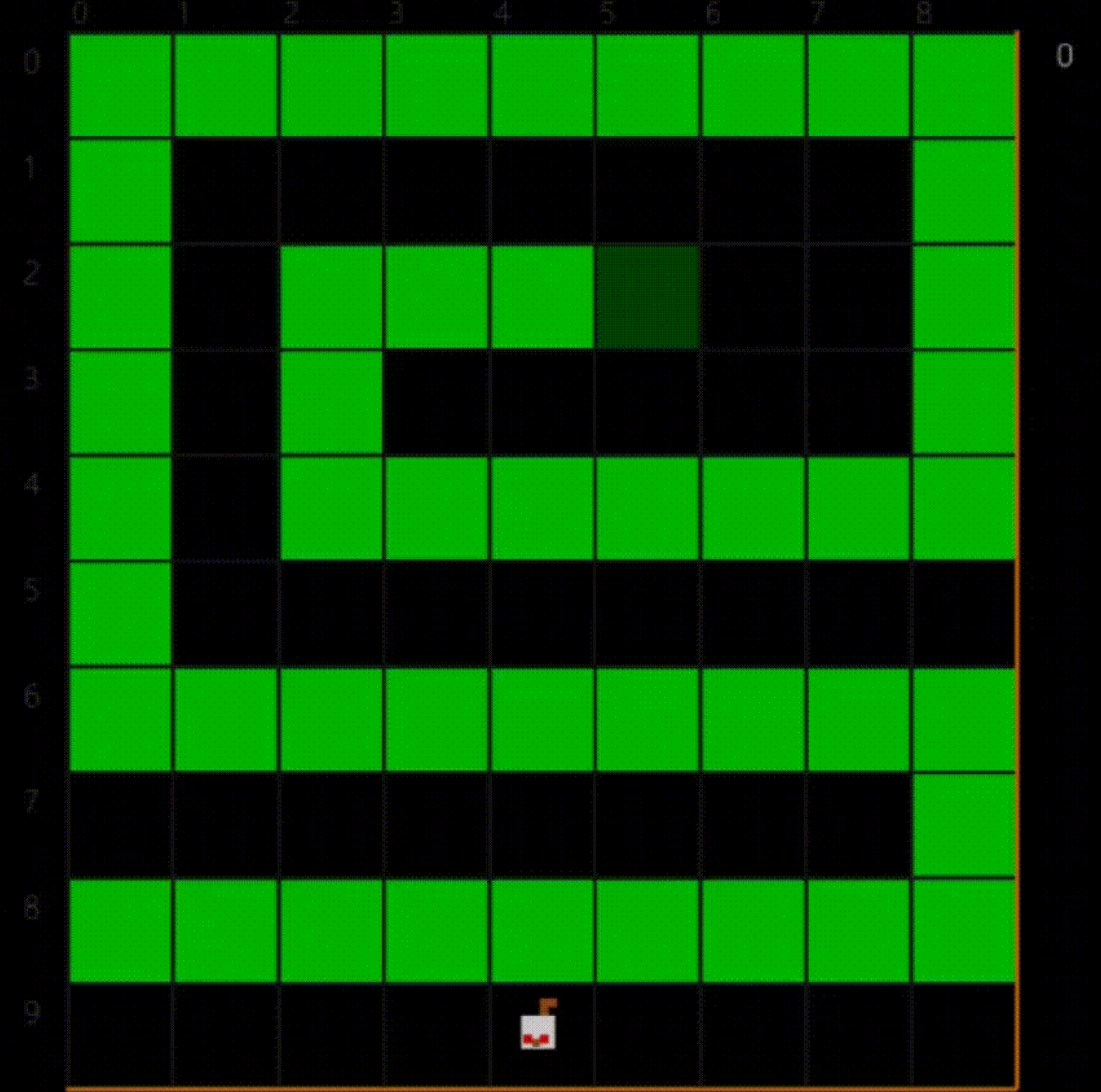


# Múltiplos Planos

move-long viper px5y1 px5y2 px1y8 px0y8

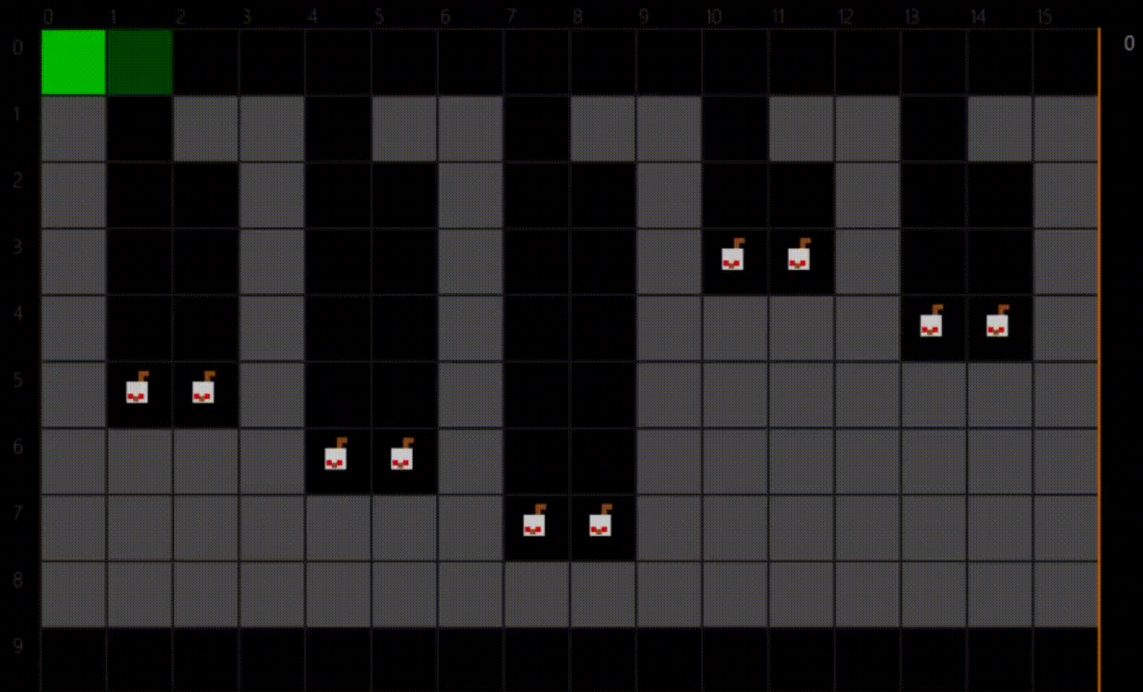


viper px5y3 px5y2 px1y8 px0y8



## FastDownWard

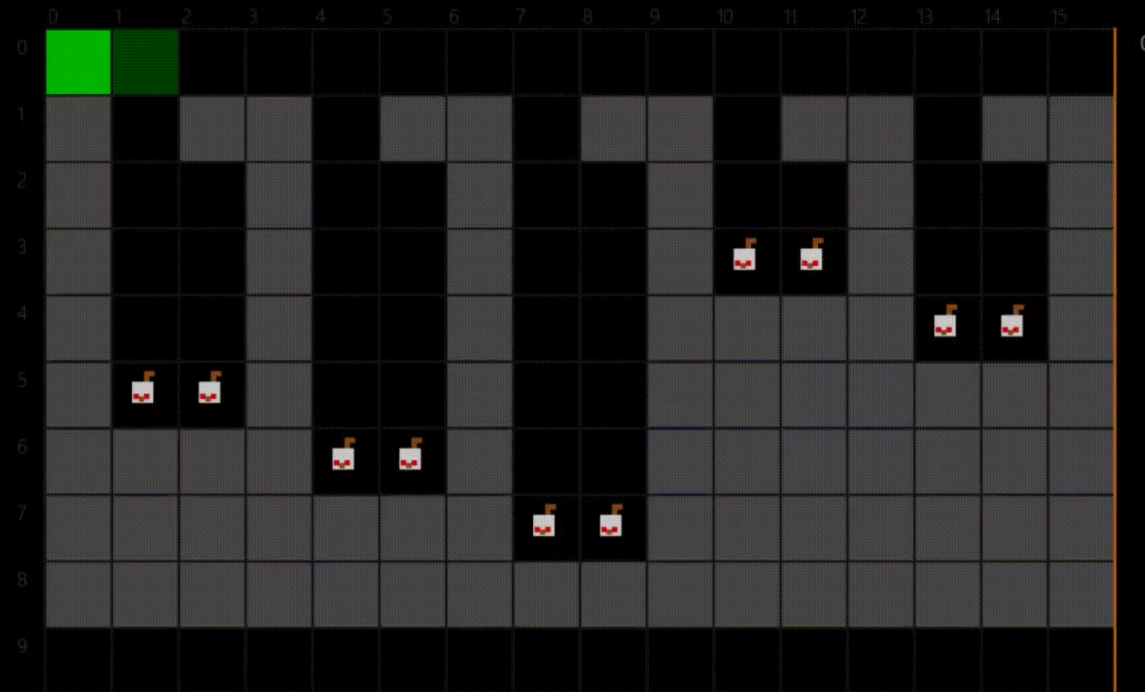
viper px2y0 px1y0 px1y0 px0y0



≈ 59,83 segundos

## PandaPI

move-long viper px2y0 px1y0 px1y0 px0y0



≈ 1405,77 segundos

# Referências e links

- Site IPC 2020: <https://ipc2020.hierarchical-task.net/>
- Repositório: <https://github.com/panda-planner-dev/ipc2020-domains>
- Resultados (utilizado para gráfico): <http://ipc2020.hierarchical-task.net/data/results-fixed.pdf>
- Site IPC 2023: <https://ipc2023-htn.github.io/>
- Repositório: <https://github.com/ipc2023-htn/ipc2023-domains>
- Resultados: (utilizado para gráficos): <https://ipc2023-htn.github.io/results>
- Github Mau Magnaguano: <https://github.com/Maumagnaguagno>
- Descrição do domínio pelo autor: [http://gki.informatik.uni-freiburg.de/competition/proceedings\\_p46-p47.pdf](http://gki.informatik.uni-freiburg.de/competition/proceedings_p46-p47.pdf)