MIDTERM REVIEW

Wednesday, Oct 19, 2016

Regular class

MIDTERM EXAM

Open book and notes (not Internet)

Saturday, Oct 22, 2016

8:00 am - 12:00 pm (4 hours)

Room LW-844

Assignment 6. Due: 10/10/16

14. Consider a modified grammar of Zones. The only difference is the definition of function *ALPHA*:

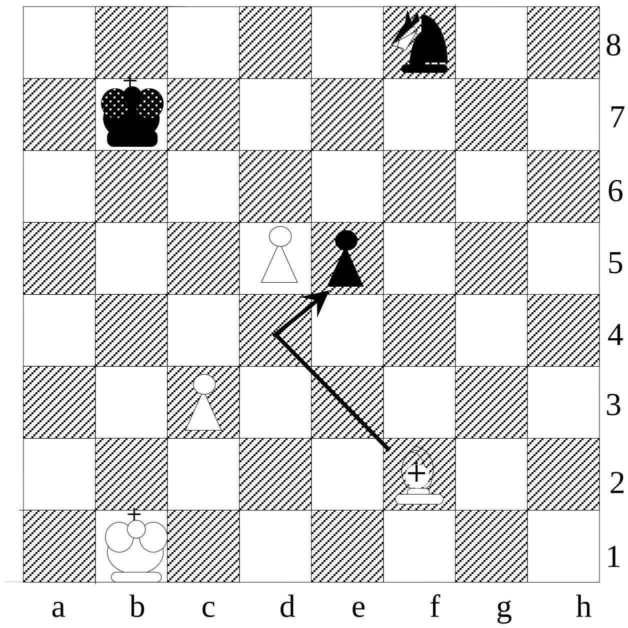
$D(\boldsymbol{ALPHA}) = X \times P \times \mathbf{L}_{\mathbf{t}}^{\boldsymbol{l}_o}(S) \times \mathbf{Z}_+$

$$\boldsymbol{ALPHA}(x, p_o, t_o, k) = \begin{cases} \boldsymbol{min}(\mathit{NEXTTIME}(x), k), & \text{if } \boldsymbol{DIST}(x, p_o, t_o) < 2n, \\ \mathit{NEXTTIME}(x), & \text{if } \boldsymbol{DIST}(x, p_o, t_o) = 2n. \end{cases}$$

What is the impact of this new definition on the Zones to be generated by this grammar? Show examples of such Zones. Explain.

<u>Extra Credit</u>.
Do we have to change function *timer* in this case? See "Translations of Languages" in the textbook on LG. Explain.

Second Negation



1	$\boldsymbol{Q_1}$	$\boldsymbol{S}(u, v, w) \to \boldsymbol{A}(u, v, w)$		*two*	ø
2_i	$\boldsymbol{Q_2}$	$\boldsymbol{A}(u, v, w) \to \boldsymbol{t}(\boldsymbol{h_i^o}(u), l_o+1)$ $\boldsymbol{A}((0, 0, 0), \boldsymbol{g}(\boldsymbol{h_i^o}(u), w), zero)$	TIME(z)=$\boldsymbol{DIST}(z, \boldsymbol{h_i^o}(u))$	3	ø
3	$\boldsymbol{Q_3}$	$\boldsymbol{A}(u, v, w) \to \boldsymbol{A}(\boldsymbol{f}(u, v), v, w)$	NEXTTIME(z)= $\boldsymbol{init}(u, \text{NEXTTIME}(z))$	*four*	5
4_j	$\boldsymbol{Q_4}$	$\boldsymbol{A}(u, v, w) \to \boldsymbol{t}(\boldsymbol{h_j}(u), \text{TIME}(y)))$ $\boldsymbol{A}(u, v, \boldsymbol{g}(\boldsymbol{h_j}(u), w))$	NEXTTIME(z)= $\boldsymbol{ALPHA}(z, \boldsymbol{h_j}(u), \text{TIME}(y) - l_j+1)$	3	3
5	$\boldsymbol{Q_5}$	$\boldsymbol{A}(u, v, w) \to \boldsymbol{A}((0, 0, 0), w, zero)$	TIME(z) = NEXTTIME(z)	3	6
6	$\boldsymbol{Q_6}$	$\boldsymbol{A}(u, v, w) \to \boldsymbol{e}$		ø	ø

$\boldsymbol{Q_1}(u) = (\text{ON}(p_o) = x) \wedge (\text{MAP}_{x,p_o}(y) \le l \le l_o) \wedge (\exists q\, ((\text{ON}(q) = y) \wedge (\text{OPPOSE}(p_o, q))))$

$\boldsymbol{Q_2}(u) = T$; $\boldsymbol{Q_3}(u) = (x \ne n) \vee (y \ne n)$

$\boldsymbol{Q_4}(u) = (\exists p\, ((\text{ON}(p) = x) \wedge (l > 0) \wedge (x \ne x_o) \wedge (x \ne y_o)) \wedge ((\neg\text{OPPOSE}(p_o, p) \wedge (\text{MAP}_{x,p}(y) = 1)) \vee (\text{OPPOSE}(p_o, p) \wedge (\text{MAP}_{x,p}(y) \le l)))$ $\boldsymbol{Q_5}(w) = (w \ne zero)$; $\boldsymbol{Q_6} = T$

$$\boldsymbol{init}(u, \text{r}) = \begin{cases} 2\text{n}, & \text{if } u = (0,0,0), \\ \text{r}, & \text{if } u \ne (0,0,0). \end{cases}$$

$$f(u,\ v) = \begin{cases} (x+1, y, l), & \text{if } ((x \ne n) \wedge (l > 0)) \vee ((y = n) \wedge (l \le 0)) \\ (1,\ y+1,\ TIME(y+1) \times v_{y+1}), & \text{if } (x = n) \vee ((l \le 0) \wedge (y \ne n)). \end{cases}$$

Let $t_o \in \mathbf{L_t}^{l_o}(S)$, $t_o = \boldsymbol{a}(z_o)\boldsymbol{a}(z_1)\ldots\boldsymbol{a}(z_m)$, $t_o \in t_{p_o}(z_o, z_m, m)$;

If $((z_m = y_o) \wedge (p = p_o) \wedge (\exists\, k\, (1 \le k \le m) \wedge (x = z_k))) \vee$
$(((z_m \ne y_o) \vee (p \ne p_o)) \wedge (\exists\, k\, (1 \le k \le m - 1) \wedge (x = z_k)))$
then $\boldsymbol{DIST}(x, p_o, t_o) = k+1$ **else** $\boldsymbol{DIST}(x, p_o, t_o) = 2n$

$$ALPHA\ (x, p_o, t_o, k) = \begin{cases} max\ (NEXTTIME\ (x), k), & \text{if } (DIST\ (x, p_o, t_o) \ne 2n) \\ & \quad \wedge (NEXTTIME\ (x) \ne 2n); \\ k, & \text{if } DIST\ (x, p_o, t_o) \ne 2n) \\ & \quad \wedge (NEXTTIME\ (x) = 2n); \\ NEXTTIME\ (x), & \text{if } DIST\ (x, p_o, t_o) = 2n). \end{cases}$$

$$\boldsymbol{g_r}(p_o, t_o, w) = \begin{cases} 1, & \text{if } \boldsymbol{DIST}(r, p_o, t_o) < 2n, \\ w_r, & \text{if } \boldsymbol{DIST}(r, p_o, t_o) = 2n. \end{cases}$$

$$\text{TRACKS}_{p_o} = \{p_o\} \times \left(\bigcup_{1 \le k \le l} L[\mathbf{G_t^{(2)}}(x, y, k, p_o)] \right.$$

If $\text{TRACKS}_{p_o} = e$

then $\boldsymbol{h_i^o}(u) = e$

else $\text{TRACKS}_{p_o} = \{(p_o, t_1), (p_o, t_2), \ldots, (p_o, t_b)\}, (b \le M)$ **and** $\boldsymbol{h_i^o}(u) = \begin{cases} (p_o, t_i), & \text{if } i \le b, \\ (p_o, t_b), & \text{if } i > b. \end{cases}$

$\text{TRACKS} = \bigcup_{\text{ON(p)=x}} \text{TRACKS}_p$, where TRACKS_p is the same as for $\boldsymbol{h_i}^o$

If TRACKS = e

then $\boldsymbol{h_i}(u) = e$

else $\text{TRACKS} = \{(p_1, t_1), (p_1, t_2), \ldots, (p_m, t_m)\}$, $(m \le M)$ **and** $\boldsymbol{h_i}(u) = \begin{cases} (p_i, t_i), & \text{if } i \le m, \\ (p_m, t_m), & \text{if } i > m. \end{cases}$

At the beginning : $u = (x_o, y_o, l_o)$, $w = zero$, $v = zero$, $x_o \in X$, $y_o \in X$, $l_o \in \mathbf{Z}_+$,
$p_o \in P$, and TIME(z)=2n, NEXTTIME(z)=2n for all z from X.