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Sec.: 2 B.N.: 27

step 1		early registı	finished hw	senior	likes coffee	liked hw	A
	ID	E1	F1	S1	L1	H1	
	1	1	1	0	0	1	yes
	2	1	1	1	0	1	yes
	3	0	0	1	0	0	no
	4	0	1	1	0	1	no
	5	0	1	1	0	0	yes
	6	0	0	1	1	1	yes
	7	1	0	0	0	1	no
	8	0	1	0	1	1	yes
	9	0	0	1	0	1	yes
	10	1	0	0	0	0	no
	11	1	1	1	0	0	yes
	12	0	1	1	1	1	no
	13	0	0	0	0	1	no
	14	1	0	0	1	0	yes

LEFT BRANCH OF F1						
step 2		early registı	senior	likes coffee	liked hw	A
F1=0	ID	E2	S2	L2	H2	
	3	0	1	0	0	no
	6	0	1	1	1	yes
	7	1	0	0	1	no
	9	0	1	0	1	yes
	10	1	0	0	0	no
	13	0	0	0	1	no
	14	1	0	1	0	yes

RIGHT BRANCH OF F1						
step 5		early registı	senior	likes coffee	liked hw	A
F1=1	ID	E5	S5	L5	H5	
	1	1	0	0	1	yes
	2	1	1	0	1	yes
	4	0	1	0	1	no
	5	0	1	0	0	yes
	8	0	0	1	1	yes
	11	1	1	0	0	yes
	12	0	1	1	1	no

LEFT BRANCH OF L2					
step 3		early registı	senior	liked hw	A
L2=0	ID	E3	S3	H3	
	3	0	1	0	no
	7	1	0	1	no
	9	0	1	1	yes
	10	1	0	0	no
	13	0	0	1	no

LEFT BRANCH OF E1					
step 6		senior	likes coffee	liked hw	A
E5=0	ID	S6	L6	H6	
	4	1	0	1	no
	5	1	0	0	yes
	8	0	1	1	yes
	12	1	1	1	no

RIGHT BRANCH OF S3				
step 4		early registı	liked hw	A
S3=1	ID	E4	H4	
	3	0	0	no
	9	0	1	yes

RIGHT BRANCH OF S6				
step 7		likes coffee	liked hw	A
S6=1	ID	L7	H7	
	4	0	1	no
	5	0	0	yes
	12	1	1	no

step1 $S \rightarrow (8+, 6-)$

$$S = -\frac{8}{14}\log_2\left(\frac{8}{14}\right) - \frac{6}{14}\log_2\left(\frac{6}{14}\right) = 0.985$$

~~$S(E1) \rightarrow (4+,$~~ attribute "early registration : E1"

$S(E1-0) \rightarrow (4+, 4-)$

$S(E1-0) = 1$

$S(E1-1) \rightarrow (4+, 2-)$

$$S(E1-1) = -\frac{4}{6}\log_2\left(\frac{4}{6}\right) - \frac{2}{6}\log_2\left(\frac{2}{6}\right) = 0.918$$

$$IG(E1) = 0.985 - \frac{8}{14}(1) - \frac{6}{14}(0.918) = \boxed{0.0201}$$

attribute "finished hw: F1"

$S(F1-0) \rightarrow (3+, 4-)$

$S(F1-0) = 0.985$

$S(F1-1) \rightarrow (5+, 2-)$

$S(F1-1) = 0.863$

$$IG(F1) = 0.985 - \frac{7}{14}(0.985) - \frac{7}{14}(0.863) = \boxed{0.061}$$

attribute "senior : S1"

$S(S1-0) \rightarrow (3+, 3-)$

$S(S1-0) = 1$

$S(S1-1) \rightarrow (5+, 3-)$

$S(S1-1) = 0.954$

$$IG(S1) = 0.985 - \frac{6}{14}(1) - \frac{8}{14}(0.954) = \boxed{0.0113}$$

attribute "likes coffee : L1"

$S(L1-0) \rightarrow (5+, 5-)$

$S(L1-0) = 1$

$S(L1-1) \rightarrow (3+, 1-)$

$S(L1-1) = 0.811$

$$IG(L1) = 0.985 - \frac{10}{14}(1) - \frac{4}{14}(0.811) = \boxed{0.039}$$

attribute "liked hw : H1"

$S(H1-0) \rightarrow (3+, 2-)$

$S(H1-0) = 0.971$

$S(H1-1) \rightarrow (5+, 4-)$

$S(H1-1) = 0.991$

$$IG(H1) = 0.985 - \frac{5}{14}(0.971) - \frac{9}{14}(0.991) = \boxed{0.00114}$$

→ highest IG @ attribute "finished hw: F1"

step 2
F1-0

$S \rightarrow (3+, 4-)$ $n = 7$

$S = 0.985$

attribute "early registration: E2"

$S(E2-0) \rightarrow (2+, 2-)$ $S(E2-1) \rightarrow (1+, 2-)$

$S(E2-0) = 1$ $S(E2-1) = 0.918$

$IG(E2) = 0.985 - \frac{4}{7}(1) - \frac{3}{7}(0.918) = \boxed{0.0201}$

attribute "senior : S2"

$S(S2-0) \rightarrow (1+, 3-)$ $S(S2-1) \rightarrow (2+, 1-)$

$S(S2-0) = 0.811$ $S(S2-1) = 0.918$

$IG(S2) = 0.985 - \frac{4}{7}(0.811) - \frac{3}{7}(0.918) = \boxed{0.128}$

attribute "likes coffee : L2"

$S(L2-0) \rightarrow (1+, 4-)$ $S(L2-1) \rightarrow (2+, 0-)$

$S(L2-0) = 0.722$ $S(L2-1) = 0$

$IG(L2) = 0.985 - \frac{5}{7}(0.722) - \frac{2}{7}(0) = \boxed{0.469}$

attribute "liked hw: H2"

$S(H2-0) \rightarrow (1+, 2-)$ $S(H2-1) \rightarrow (2+, 2-)$

$S(H2-0) = 0.918$ $S(H2-1) = 1$

$IG(H2) = 0.985 - \frac{3}{7}(0.918) - \frac{4}{7}(1) = \boxed{0.0201}$

→ highest IG @ L2 : likes coffee

step 3
L2-0

$n = 5$ $S \rightarrow (1+, 4-)$ $S = 0.722$.

$IG(E3) = 0.722 - \frac{3}{5}(0.918) - \frac{2}{5}(0) = 0.172$

$IG(S3) = 0.722 - \frac{3}{5}(0) - \frac{2}{5}(1) = 0.322$

$IG(H3) = 0.722 - \frac{2}{5}(0) - \frac{3}{5}(0.918) = 0.172$

→ highest IG @ S3 : senior

step 4 | $n=2$ $S \rightarrow (1+, 1-)$ $S=1$

S3 = 1

$IG(E_4) = 1 - \frac{2}{2}(1) - \frac{0}{2} = 0$

$IG(H_4) = 1 - \frac{1}{2}(0) - \frac{1}{2}(0) = 1$

→ highest IG @ H_4 : liked hw

step 5 | $n=7$ $S \rightarrow (5+, 2-)$ $S=0.863$

F1 = 1

$IG(E5) = 0.863 - \frac{4}{7}(1) - \frac{3}{7}(0) = 0.292$

$IG(S5) = 0.863 - \frac{2}{7}(0) - \frac{5}{7}(0.971) = 0.169$

$IG(L5) = 0.863 - \frac{5}{7}(0.722) - \frac{2}{7}(1) = 0.062$

$IG(H5) = 0.863 - \frac{2}{7}(0) - \frac{5}{7}(0.971) = 0.169$

→ highest IG @ E5 : early registration

step 6 | $n=4$ $S \rightarrow (2+, 2-)$ $S=1$

E5 = 0

$IG(S6) = 1 - \frac{1}{4}(0) - \frac{3}{4}(0.918) = 0.3115$

$IG(L6) = 1 - \frac{2}{4}(1) - \frac{2}{4}(1) = 0$

$IG(H6) = 1 - \frac{1}{4}(0) - \frac{3}{4}(0.918) = 0.3115$

→ highest IG @ S6 and H_6 : senior and liked hw

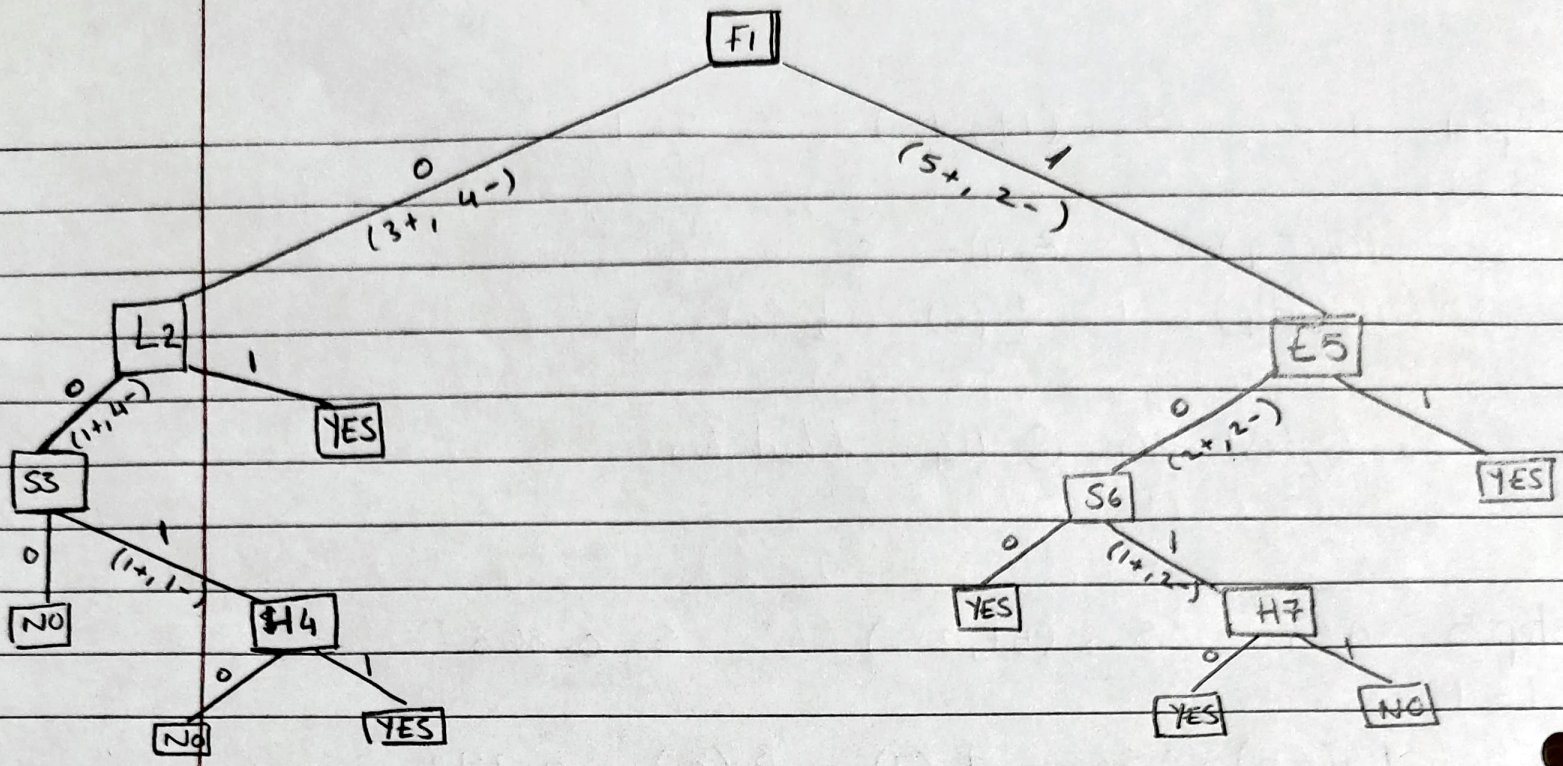
step 7 | $n=3$ $S \rightarrow (1+, 2-)$ $S=0.918$

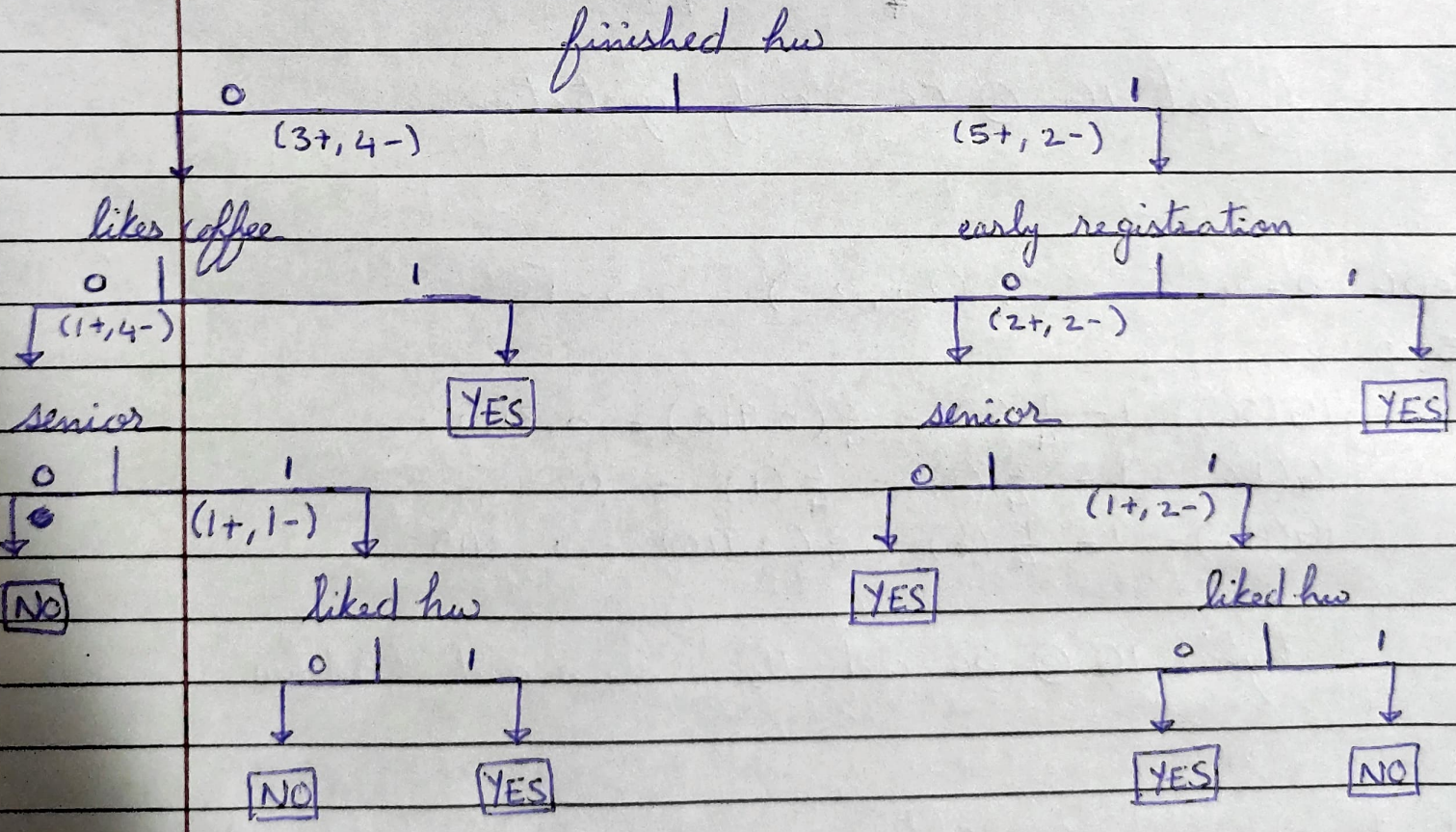
S6 = 1

$IG(L7) = 0.918 - \frac{2}{3}(1) - \frac{1}{3}(0) = 0.2513$

$IG(H7) = 0.918 - \frac{1}{3}(0) - \frac{2}{3}(0) = 0.918$

→ highest IG @ H7: liked hw


F1
0
(3+, 4-)
1
(5+, 2-)
L2
1
YES
0
(1+, 4-)
S3
0
NO
1
(1+, 1-)
H4
0
NO
1
YES
E5
0
(3+, 2-)
1
YES
S6
0
YES
1
(1+, 2-)
H7
0
YES
1
NO


finished hw
0
(3+, 4-)
1
(5+, 2-)
likes coffee
0
(1+, 4-)
1
YES
senior
0
NO
1
(1+, 1-)
liked hw
0
NO
1
YES
early registration
0
(2+, 2-)
1
YES
senior
0
YES
1
(1+, 2-)
liked hw
0
YES
1
NO