CS 271 - Introduction to Artificial Intelligence **Fall 2016**

HomeWork 2

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Problem 1 **Solution:**

Define cost function as how many constrains are violated. At beginning the cost is 4.

First Iteration: Assume algorithm choose assignment 1, then neighbor node list as following:

choice	cost
help	3
desk	3
easy	4
else	4
kind	4
soon	4

Algorithm chooses work help.

Second Iteration: Assume algorithm choose assignment 2, then neighbor node list as following:

choice	cost
eta	3
hat	3
her	3
him	3
one	3

Algorithm randomly chooses eta again.

Third Iteration: Assume algorithm choose assignment 3, then neighbor node list as following:

choice	cost
dance	3
usage	2
first	3
loses	3
fuels	3
haste	3
given	3
sense	3
think	3
sound	3

So, Algorithm chooses word usage.

Problem 2 **Solution:**

Variables: $\{T_i\}$ represents i^{th} class's time.
$\{I_i\}$ represents i^{th} class's instructor.
$\{R_i\}$ represents i^{th} class's classroom.

Domains: Domains of T_i is a set of possible slot time for Class i
Domains of I_i is a set of possible instructor for Class i
Domains of R_i is a set of possible classroom for Class i

Constrains: For any two class whose time slots are overlapped with each other, their classroom and instructor should be different and their.

Problem 3 **Solution:**

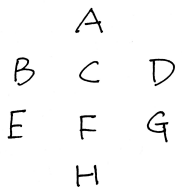
Variables: $\{(X_i, Y_i)\}$ represents coordinate of i^{th} rectangle's left upper point.

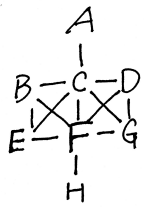
Domains: $0 \leq X_i \leq X - dX_i$
$0 \leq Y_i \leq Y - dY_i$

Constrains: assume $minX_i = X_i$, $maxX_i = X_i + dX_i$, $minY_i = Y_i$, $maxY_i = Y_i + dY_i$.
Then for any two rectangle i,j, at least one of following hold:
$max(minX_i, minX_j) > min(maxX_i, maxX_j)$
$max(minY_i, minY_j) > min(maxY_i, maxY_j)$

Problem 4 **Solution:**

(a) label the cell as following graph.





(b) Yes

(c) No

Problem 5 **Solution:**

(a) New Domain as following:
$D_2, D_3 = \{3, 4, 5, 6, 7, 8, 9\}$
$D_4, D_5, D_6, D_7 = \{5, 6, 7, 8, 9\}$
$D_8, D_9, ..., D_{15} = \{7, 8, 9\}$

(b) One solution is following:
$X_1 = 1$
$X_2, X_3 = 3$
$X_4, X_5, X_6, X_7 = 5$
$X_8, X_9, ..., X_{15} = 7$

(c) from small to large

(d) assume d is the size of domain, $O(15 * d^2) = O(d^2)$

Problem 6 **Solution:**

$734 + 734 = 1468$

Problem 7 **Solution:**

(a) variable elimination

(b) variable elimination

(c) variable elimination