

HW 6

Not due, practice only

CS442: Great Insights in Computer Science
Michael L. Littman, Spring 2006

1. Red, White, or Blue

PMI-IR is a statistical approach to relating words to one another. For two words x and y , it measures similarity $\text{sim}(x,y)$ as $C(x \text{ and } y) / (C(x) C(y))$ where $C(w)$ is the count of the number of web pages containing w and $C(x \text{ and } y)$ is the number of web pages containing both words.

We can use PMI-IR to ask Google whether it thinks objects are red, white, or blue. For a word x , if $\text{sim}(x,\text{red}) > \text{sim}(x,\text{blue})$, $\text{sim}(x,\text{red}) > \text{sim}(x,\text{white})$, we say Google thinks x is red.

continued

Fill out the table below to figure out what color Google thinks apples, snow, and water is.

	$C(x)$	$C(x \text{ and red})$ $\text{sim}(x, \text{red})$	$C(x \text{ and white})$ $\text{sim}(x, \text{white})$	$C(x \text{ and blue})$ $\text{sim}(x, \text{blue})$	best choice
(i) apple					
(ii) snow					
(iii) water					

2. Language and Word

Please, don't use an example from lecture.

- (i) Give an example of a word game, one that involves words, but not their meanings.

- (ii) Give an example of a language game, one that involves words and their meanings.

3. Robot Control

Match the descriptions below to the subroutines to the right for controlling the “Scribbler” robot.

a. Light any LED corresponding to a direction in which light is detected.

b. Move forward until the robot hits something, then play ‘Charge!’ and stop.

c. Robot spins in place whenever lights go on.

```
def prog1():
  while true:
    if lights("avg") > 10:
      move(-50,50,0)
    else:
      move(0,0,0)
```

```
def prog2():
  while true:
    if lights("lxx") > 10:
      led("lxx")
    if lights("xlx") > 10:
      led("lxx")
    if lights("xxl") > 10:
      led("lxx")
```

```
def prog3():
  while not bump():
    move(50,50,0)
  play("charge")
```

Amino Acid Code (DNA)

TTT Phenylalanine (Phe) TTC Phe TTA Leucine (Leu) TTG Leu	TCT Serine (Ser) TCC Ser TCA Ser TCG Ser	TAT Tyrosine (Tyr) TAC Tyr TAA STOP TAG STOP	TGT Cysteine (Cys) TGC Cys TGA STOP TGG Tryptophan (Trp)
CTT Leucine (Leu) CTC Leu CTA Leu CTG Leu	CCT Proline (Pro) CCC Pro CCA Pro CCG Pro	CAT Histidine (His) CAC His CAA Glutamine (Gln) CAG Gln	CGT Arginine (Arg) CGC Arg CGA Arg CGG Arg
ATT Isoleucine (Ile) ATC Ile ATA Ile ATG Methionine/START	ACT Threonine (Thr) ACC Thr ACA Thr ACG Thr	AAT Asparagine (Asn) AAC Asn AAA Lysine (Lys) AAG Lys	AGT Serine (Ser) AGC Ser AGA Arginine (Arg) AGG Arg
GTT Valine (Val) GTC Val GTA Val GTG Val	GCT Alanine (Ala) GCC Ala GCA Ala GCG Ala	GAT Aspartic acid (Asp) GAC Asp GAA Glutamic acid (Glu) GAG Glu	GGT Glycine (Gly) GGC Gly GGA Gly GGG Gly

4. Gene Seeker

- Here's the initial segment of the HPV genome, which causes cervical cancer. It has been in the news lately because of new vaccines.

actacaataattcatgtataaaactaagggcgtaaccgaaatcggttgaa

- Using the amino acid code left to right (including STOP/START codon!), what sequence of amino acids does it code for?