CS6320, Fall 2018 Dr. Mithun Balakrishna Homework 4 Due November 18th, 2018 11:59pm

A. Submission Instructions:

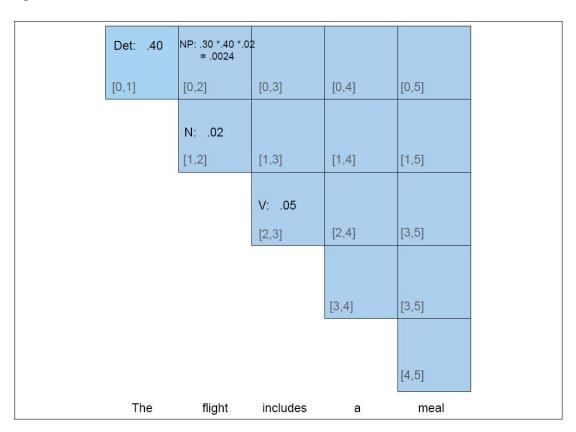
- Submit your solutions via eLearning.
- Please submit a single zip file with the following files:
 - o For programming questions:
 - Source code file(s) in C/C++, Java, or Python. For using any other programming language, please get prior approval from the TA.
 - A ReadMe file with instructions on how to compile/run the code.
 - o For all other questions, a PDF/Doc/PS/Image file with the solutions.
- Late Submission Penalty:
 - o up to 2 hours late 10% deduction
 - o 2 4 hours late 20% deduction
 - o 4 12 hours late 35% deduction
 - o 12 24 hours late 50% deduction
 - o 24 48 hours late 75% deduction
 - o more than 48 hours late 100% deduction (zero credit)

B. Problems:

1. Statistical Parsing (25 points)

S	$\rightarrow NP VP$.80	Det	$\rightarrow the$.40
NP	\rightarrow <i>Det N</i>	.30	Det	$\rightarrow a$.40
VP	$\rightarrow VNP$.20	N	\rightarrow meal	.01
V	\rightarrow includes	.05	N	$\rightarrow flight$.02

Using the above grammar rules, fill out the rest of the probabilistic CKY chart in the figure below:



2. Thematic Roles (25 points)

Thematic Role	Definition Example	
Agent	The volitional causer of an event The waiter spilled the soup.	
Experiencer	The experiencer of and event John has a headache.	
Force	The non-volitional causer of the event The wind blows debris from the mall into our yards.	
Theme	The participant most directly affected by an event Only after Benjamin Franklin broke <i>the ice</i>	
Result	The end product of an event The French government has built a regular-size baseball diamond	
Content	The proposition or content of a propositional event Mona asked "You met Mary Ann at a super market?"	
Instrument	An instrument used in an event He turned to poaching catfish, stunning them with a shocking device	
Beneficiary	The beneficiary of an event Whenever Ann Callahan makes hotel reservations for her boss	
Source	The origin of the object of a transfer event I flew in from Boston.	
Goal	The destination of an object of a transfer event I drove to Portland.	

Using the thematic role definitions from the above table, assign the various verb arguments in the following WSJ examples to their appropriate thematic roles:

- 1. The intense heat buckled the highway about three feet.
- 2. He melted her reserve with a husky-voiced paean to her eyes.
- 3. But Mingo, a major Union Pacific shipping center in the 1890s, has melted away to little more than the grain elevator now.

3. Word Sense Disambiguation (50 points):

```
function SIMPLIFIED LESK(word, sentence) returns best sense of word

best-sense ← most frequent sense for word

max-overlap ← 0

context ← set of words in sentence

for each sense in senses of word do

signature ← set of words in the gloss and examples of sense

overlap ← COMPUTEOVERLAP(signature, context)

if overlap > max-overlap then

max-overlap ← overlap

best-sense ← sense

end

return(best-sense)
```

Using WordNet Library API to access the WordNet dictionary, implement the SIMPLIFIED LESK algorithm to disambiguate the word *bank* in the sentence. Your output should show the word overlap for each sense of the word *bank* in WordNet and the final chosen sense.

The bank can guarantee deposits will eventually cover future tuition costs because it invests in adjustable-rate mortgage securities.