

# Homework 8

Changlan Chen

## 1 Problem 1

### 1.1

Word 1: that; log-probability: -1.00;

Word 2: because; log-probability: -1.32.

### 1.2

We need to choose 2 from the 4 outputs.

The candidates:

1: ... that it  $(-1.00, -0.98) = -1.98$

2: ... that we  $(-1.00, -2.43) = -3.43$

3: ... because it  $(-1.32, -1.00) = -2.32$

4: ... because we  $(-1.32, -2.59) = -3.91$

So we choose 1 and 3.

### 1.3

Time Step	Hypothesis 1	Log Probability 1	Hypothesis 2	Log Probability 2
1	that	-1.0	because	-1.32
2	it	-1.98	it	-2.32
3	is	-3.44	can	-3.57
4	be	-5.18	help	-5.7
5	used	-5.98	us	-7.01
6	to	-6.61	for	-8.1
7	solve	-8.98	predict	-9.61
8	problems	-10.43	the	-10.79
9	that	-12.36	future	-11.8
10	are	-13.61	behavior	-13.44
11	not	-15.21	of	-13.51
12	a	-14.87	the	-15.74
13	system	-16.42	human	-17.41
14	.	-17.48	system,	-18.12
15	.	-17.48	and	-19.64
16	.	-17.48	it	-21.21
17	.	-17.48	can	-22.01
18	.	-17.48	be	-23.34
19	.	-17.48	used	-23.65
20	.	-17.48	to	-23.89
21	.	-17.48	predict	-26.11
22	.	-17.48	the	-26.8
23	.	-17.48	future	-28.22
24	.	-17.48	behavior	-28.75
25	.	-17.48	of	-28.78
26	.	-17.48	a	-29.46
27	.	-17.48	system	-30.75
28	.	-17.48	.	-32.5

### 1.4

The first hypothesis is reasonable yet the second is too verbose that it repeats the same sentences.

## 1.5

Time Step	Hypothesis 1	Log Probability 1
1	that	-1.0
2	it	-1.98
3	is	-3.44
4	a	-5.81
5	way	-8.66
6	to	-9.29
7	make	-12.19
8	people	-14.41
9	more	-16.45
10	aware	-17.89
11	of	-18.09
12	their	-19.04
13	own	-20.63
14	capabilities	-23.41
15	.	-24.25

## 2 Problem 2

$e(\text{plane}) - e(\text{auto}) + e(\text{boat}) \in \{e(\text{plane}), e(\text{boat}), e(\text{boats}), e(\text{planes}), e(\text{vessel})\}$   
 $e(\text{biology}) - e(\text{data}) + e(\text{computer}) \in \{e(\text{biology}), e(\text{computer}), e(\text{computers}), e(\text{genetics}), e(\text{visits})\}$   
 $e(\text{German}) - e(\text{English}) + e(\text{Mandarin}) \in \{e(\text{Mandarin}), e(\text{Filipino}), e(\text{German}), e(\text{Vietnamese}), e(\text{Taiwanese})\}$

## 3 Problem 3

### 3.1

Word: ring  
S1: She has a ring on her middle finger.  
S2: The telephones ring for a while.  
similarity: 0.585

### 3.2

Word: general  
S1: The army general is upset about the battle.  
S2: In general, it is great.  
similarity: 0.437

### 3.3

Word: fair

S1: The welcoming fair on the campus is well-organized.  
S2: The law is not always fair to people.  
similarity: 0.601