

# **Homework -3**

**CS 6320**

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## Problem1: Word Sense Disambiguation (WSD)

In this problem you asked to use the WordNet thesaurus/semantic dictionary to disambiguate the sense of all the words from the following short text:

*“The singer will not be performing at this year's festival after all. An accomplished singer, songwriter, dancer, and style guru, she graced the festival's stage last year when she joined her big sister during her historic, headlining tour. “*

Present your annotations in the following format:

If the text is “**Her brother killed the idea of a trip.**” The word-sense annotations would be: Her **brother:n#1** killed:v#2 the **idea:n#2** of a **trip:n#1**.

The **singer#n1** will not be **performing#v3** at this **year's#n1 festival#n2 after all#adv2**. An **accomplished#adj1 singer#n1, songwriter#n1, dancer#n1, and style#n1 guru#n3**, she **graced#v1** the **festival's#n2 stage#n3 last#adj1 year#n1** when she **joined#v3** her **big sister#n1** during her **historic#adj2, headlining#v1 tour#n1**.

- a. Produce the manual disambiguation of the text (10points)

Words	Word Sense
Singer	<ul style="list-style-type: none"><li><b>S:</b> (n) <b>singer#1</b>, <a href="#">vocalist</a>, <a href="#">vocalizer</a>, <a href="#">vocaliser</a> (a person who sings)</li></ul>
performing	<ul style="list-style-type: none"><li><b>S:</b> (v) <a href="#">perform#3</a> (give a performance (of something)) <i>"Horowitz is performing at Carnegie Hall tonight"; "We performed a popular Gilbert and Sullivan opera"</i></li></ul>
year's	<ul style="list-style-type: none"><li><b>S:</b> (n) <a href="#">year#1</a>, <a href="#">twelvemonth</a>, <a href="#">yr#1</a> (a period of time containing 365 (or 366) days) <i>"she is 4 years old"; "in the year 1920"</i></li></ul>
festival	<ul style="list-style-type: none"><li><b>S:</b> (n) <b>festival#2</b>, <a href="#">fete#2</a> (an organized series of acts and performances (usually in one place)) <i>"a drama festival"</i></li></ul>
after all	<ul style="list-style-type: none"><li><b>S:</b> (adv) <b>after all#2</b> (in spite of expectations) <i>"came to the party after all"; "it didn't rain after all"</i></li></ul>
accomplished	<ul style="list-style-type: none"><li><b>S:</b> (adj) <b>accomplished#1</b>, <a href="#">complete#3</a> (highly skilled) <i>"an accomplished pianist"; "a complete musician"</i></li></ul>
songwriter	<ul style="list-style-type: none"><li><b>S:</b> (n) <b>songwriter#1</b>, <a href="#">songster#1</a>, <a href="#">ballad maker#1</a> (a composer of words or music for popular songs)</li></ul>

dancer	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (n) <b>dancer#1</b>, <a href="#">professional dancer#1</a>, <a href="#">terpsichorean#1</a> (a performer who dances professionally)</li> </ul>
style	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (n) <a href="#">manner#1</a>, <a href="#">mode#1</a>, <b>style#1</b>, <a href="#">way#1</a>, <a href="#">fashion#1</a> (how something is done or how it happens) <i>"her dignified manner"; "his rapid manner of talking"; "their nomadic mode of existence"; "in the characteristic New York style"; "a lonely way of life"; "in an abrasive fashion"</i></li> </ul>
guru	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (n) <b>guru#3</b> (a recognized leader in some field or of some movement) <i>"a guru of genomics"</i></li> </ul>
graced	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (v) <a href="#">decorate#1</a>, <a href="#">adorn#1</a>, <a href="#">grace#1</a>, <a href="#">ornament#1</a>, <a href="#">embellish#3</a>, <a href="#">beautify#3</a> (make more attractive by adding ornament, colour, etc.) <i>"Decorate the room for the party"; "beautify yourself for the special day"</i></li> </ul>
stage	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (n) <b>stage#3</b> (a large platform on which people can stand and can be seen by an audience) <i>"he clambered up onto the stage and got the actors to help him into the box"</i></li> </ul>
last	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (adj) <b>last#1</b> (immediately past) <i>"last Thursday"; "the last chapter we read"</i></li> </ul>
joined	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (v) <a href="#">join#3</a> (come into the company of) <i>"She joined him for a drink"</i></li> </ul>
big sister	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (n) <b>big sister#1</b> (an older sister)</li> </ul>
historic	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (adj) <b>historic#2</b> (important in history) <i>"the historic first voyage to outer space"</i></li> </ul>
headlining	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (v) <a href="#">headline#1</a> (publicize widely or highly, as if with a headline)</li> </ul>
tour	<ul style="list-style-type: none"> <li>• <a href="#">S:</a> (n) <b>tour#1</b>, <a href="#">circuit#2</a> (a journey or route all the way around a particular place or area) <i>"they took an extended tour of Europe"; "we took a quick circuit of the park"; "a ten-day coach circuit of the island"</i></li> </ul>

#### b. Simple Lesk WSD algorithm

Result of running WSD.py file. Check README for steps to execute WSD.py file

```
Word: singer
best sense: Synset('singer.n.01')
a person who sings
```

```
Word: performing
best sense: Synset('acting.n.01')
the performance of a part or role in a drama
```

Word: year  
best sense: Synset('year.n.02')  
a period of time occupying a regular part of a calendar year that is used for some particular activity

Word: festival  
best sense: Synset('festival.n.01')  
a day or period of time set aside for feasting and celebration

Word: after\_all  
best sense: Synset('after\_all.r.01')  
emphasizes something to be considered

Word: accomplished  
best sense: Synset('carry\_through.v.01')  
put in effect

Word: songwriter  
best sense: Synset('songwriter.n.01')  
a composer of words or music for popular songs

Word: dancer  
best sense: Synset('dancer.n.01')  
a performer who dances professionally

Word: style  
best sense: Synset('expressive\_style.n.01')  
a way of expressing something (in language or art or music etc.) that is characteristic of a particular person or group of people or period

Word: guru  
best sense: Synset('guru.n.01')  
a Hindu or Buddhist religious leader and spiritual teacher

Word: graced  
best sense: Synset('decorate.v.01')  
make more attractive by adding ornament, colour, etc.

Word: stage  
best sense: Synset('stage.v.01')  
perform (a play), especially on a stage

Word: last  
best sense: Synset('last.n.02')  
the last or lowest in an ordering or series

Word: joined  
best sense: Synset('join.v.02')  
cause to become joined or linked

Word: big\_sister  
best sense: Synset('big\_sister.n.01')  
an older sister

Word: historic  
best sense: Synset('historic.s.01')  
belonging to the past; of what is important or famous in the past

Word: headlining  
best sense: Synset('headline.v.01')  
publicize widely or highly, as if with a headline

Word: tour  
best sense: Synset('tour.v.01')  
make a tour of a certain place

No of common predictions  
Accuracy =  $12 / 18 = 0.6667$   
Accuracy = 66.67%

## Problem2: Information Extraction

- a. Identify manually the Named Entities in the following text:

Using the following Name Entity Categories and their respective acronyms:  
PERSON (PER), LOCATION (LOC), ENTERTAINMENT-EVENT (ENT), ORGANIZATION (ORG),  
ALBUM-TITLE (ALB).

*[PER Solange Knowles] will not be performing at this year's [ENT Coachella Music and Arts Festival] after all. [ENT The music festival's] official [ORG Twitter] account announced the news Sunday night. [PER Knowles] released her new album, "[ALB When I Get Home]," last month. An accomplished singer, songwriter, dancer, DJ and style guru, [PER Knowles]*

graced [**LOC** the Coachella stage] last year when she joined her big sister, [**PER** Beyoncé], during her historic, headlining tour. [**PER** Ariana Grande], [**PER** Childish Gambino], and [**PER** Tame Impala] are headlining the festival this year. [**ENT** Coachella] takes place annually over two weekends in April in [**LOC** Indio, California].

b. Using IOB notation to indicate the labels for the following text.

*Solange Knowles will not be performing at this year's Coachella Music and Arts Festival after all.*

Words	IOB Label
Solange	B-PER
Knowles	I-PER
will	O
not	O
be	O
performing	O
at	O
this	O
year	O
'	O
s	O
Coachella	B-ENT
Music	I-ENT
and	I-ENT
Arts	I-ENT
Festival	I-ENT
after	O
all	O
.	O

*The music festival's official Twitter account announced the news Sunday night*

Words	IOB Label
The	B-PER
music	I-ENT
festival	I-ENT

'	O
s	O
official	O
Twitter	B-ORG
account	O
announced	O
the	O
news	O
Sunday	O
night	O
.	O

*Knowles released her new album, "When I Get Home," last month.*

Words	IOB Label
Knowles	B-PER
released	O
her	O
new	O
album	O
,	O
“	O
When	B-ALB
I	I-ALB
Get	I-ALB
Home	I-ALB
,	O
“	O
last	O
month	O
.	O

*An accomplished singer, songwriter, dancer, DJ and style guru, Knowles graced the Coachella stage last year when she joined her big sister, Beyoncé, during her historic, headlining tour.*

Words	IOB Label
-------	-----------

An	O
accomplished	O
singer	O
,	O
songwriter	O
,	O
dancer	O
,	O
DJ	O
and	O
style	O
guru	O
,	O
Knowles	B-PER
graced	O
the	B-LOC
Coachella	I-LOC
stage	I-LOC
last	O
year	O
when	O
she	O
joined	O
her	O
big	O
sister	O
,	O
Beyonce	B-PER
,	O
during	O
her	O
historic	O
,	O
headlining	O
tour	O



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*Ariana Grande, Childish Gambino, and Tame Impala are headlining the festival this year.*

Words	IOB Label
Ariana	B-PER
Grande	I-PER
,	O
Childish	B-PER
Gambino	I-PER
,	O
and	O
Tame	B-PER
Impala	I-PER
are	O
headlining	O
the	O
festival	O
this	O
year	O
.	O

*Coachella takes place annually over two weekends in April in Indio, California.*

Words	IOB Label
Coachella	B-ENT
takes	O
place	O
annually	O
over	O
two	O
weekends	O
in	O
April	O

in	O
Indio	B-LOC
,	I-LOC
California	I-LOC
.	O

c. Annotate manually the temporal expressions for the text:

Solange Knowles will not be performing at <TIMEX3> this year's </TIMEX3> Coachella Music and Arts Festival after all. The music festival's official Twitter account announced the news <TIMEX3> Sunday night </TIMEX3>. Knowles released her new album, "When I Get Home," <TIMEX3> last month </TIMEX3>. An accomplished singer, songwriter, dancer, DJ and style guru, Knowles graced the Coachella stage <TIMEX3> last year </TIMEX3> when she joined her big sister, Beyoncé, during her historic, headlining tour. Ariana Grande, Childish Gambino, and Tame Impala are headlining the festival <TIMEX3> this year</TIMEX3>. Coachella takes place <TIMEX3> annually </TIMEX3> over <TIMEX3> two weekends </TIMEX3> in <TIMEX3> April</TIMEX3> in Indio, California.

d. Perform temporal normalization of the temporal expressions identified earlier.

The document was posted on <Timex3 id = 'id1' type = 'date' value= '2020-04-20' functionInDocument = 'CREATION\_TIME'> April 16<sup>th</sup>,2020 </Timer>.

Solange Knowles will not be performing at <TIMEX3 id="t2" type="DATE" value="2020" anchorTimeId="t1" functionInDocument="MODIFICATION\_TIME" > this year's </TIMEX3> Coachella Music and Arts Festival after all. The music festival's official Twitter account announced the news <TIMEX3 id="t3" type="DATE" value="2020-04-19" anchorTimeId="t1" functionInDocument="RELEASE\_TIME"> Sunday night </TIMEX3>. Knowles released her new album, "When I Get Home," <TIMEX3 id="t4" type="DATE" value="2020-03" anchorTimeId="t1" functionInDocument="RELEASE\_TIME"> last month </TIMEX3>. An accomplished singer, songwriter, dancer, DJ and style guru, Knowles graced the Coachella stage <TIMEX3 id="t5" type="DATE" value="2019" anchorTimeId="t1" functionInDocument="RECEPTION\_TIME"> last year </TIMEX3> when she joined her big sister, Beyoncé, during her historic, headlining tour. Ariana Grande, Childish Gambino, and Tame Impala are headlining the festival <TIMEX3 id="t6" type="DATE" value="2020" anchorTimeId="t1" functionInDocument="CREATION\_TIME"> this year </TIMEX3>. Coachella takes place <TIMEX3 id="t7" type="DURATION" value="None" functionInDocument="RECEPTION\_TIME"> annually</TIMEX3> over <TIMEX3 id="t7" type="DURATION" value="P2WE" functionInDocument="CREATION\_TIME" anchorTimeId="t6"> two weekends</TIMEX3> in <TIMEX3 id="t8" type="DURATION"

value="P2WE" functionInDocument="CREATION\_TIME" anchorTimeID="t7"> April</TIMEX3> in Indio, California.

- e. Identify the relation in the text.
- **TYPE 1:** PERSON → *Entertainer* → ENTERTAINMENT-EVENT (PER → *Entertainer* → ENT)
  - **TYPE 2:** PERSON → *Family* → PERSON (PER → *Family* → PER)
  - **TYPE 3:** PERSON → *Involved-in* → ALBUM-TITLE (PER → *Involved-in* → ALB)
  - **TYPE 4:** ENTERTAINMENT-EVENT → *Happens-in* → LOCATION (ENT → *Happens-in* → LOC)
  - **TYPE 5:** ENTERTAINMENT-EVENT → *Communicates-through* → ORGANIZATION (ENT → *Communicates-through* → ORG)

When presenting the relations that you manually discover, use the following format:

[Tim Warner]<sub>PER</sub> → Spokesman → [American Airlines]<sub>ORG</sub>

Indicate how many relations of each type that you have discovered.

[Solange Knowles]<sub>PER</sub> → Entertainer → [Coachella Music and Arts Festival]<sub>ENT</sub> (Type 1)

[Coachella Music and Arts Festival]<sub>ENT</sub> → Communicates-through → Twitter (Type 5)

[Knowles]<sub>PER</sub> → Involved-in → [When I Get Home]<sub>ALB</sub> (Type 3)

[Knowles]<sub>PER</sub> → Family → [Beyoncé]<sub>PER</sub> (Type 2)

[Beyoncé]<sub>PER</sub> → Entertainer → [Coachella Music and Arts Festival]<sub>ENT</sub> (Type 1)

[Ariana Grande]<sub>PER</sub> → Entertainer → [Coachella Music and Arts Festival]<sub>ENT</sub> (Type 1)

[Childish Gambino]<sub>PER</sub> → Entertainer → [Coachella Music and Arts Festival]<sub>ENT</sub> (Type 1)

[Tame Impala]<sub>PER</sub> → Entertainer → [Coachella Music and Arts Festival]<sub>ENT</sub> (Type 1)

[Coachella Music and Arts Festival]<sub>ENT</sub> → Happens-in → [Indio, California]<sub>LOC</sub> (Type 4)

f.

Type	Relation	In the sentence
Family	PER -> Family -> PER	Knowles -> big sister -> Beyonce
ORG Affiliation	Ent -> Communicates-through -> ORG	Music festival -> communicates through -> Twitter
Located	ENT -> Happens-in -> LOC	Coachella -> located-in -> Indio, California
Membership	PER -> Involved-in -> ORG	Ariana Grade -> Involved-in -> Coachella
Part-Whole (Geography)	LOC -> is-a-part-of -> LOC	Indio -> is-a-part-of -> California

### Extra-Credit Problem1: (50 points)

- a. Identify the events in the text and annotate in TimeBank format for following text:

The document was <EVENT id = "e1" class = "ASPECTUAL" tense = "past" aspect = "PERFECTIVE"> posted </EVENT> on <TIMEX3 id = "t1" type = "DATE" value = "2019-04-20" functionInDocument = "CREATION\_TIME"> April 20th, 2020 </Timex>.

Solange Knowles will not be <EVENT id="e2" class="OCCURRENCE" tense="future" aspect="PERFECTIVE"> performing </EVENT> at <TIMEX3 id = "t2" type = "DATE" value = "2019" anchorTimeId = "t1" functionInDocument = "MODIFICATION\_TIME" > this year's </TIMEX3> Coachella Music and Arts Festival after all.

The music festival's official Twitter account <EVENT id="e3" class="REPORTING" tense="past" aspect="PERFECTIVE"> announced </EVENT> the news <TIMEX3 id="t3" type="DATE" value="2020-04-19" anchorTimeId="t1" functionInDocument="RELEASE\_TIME"> Sunday night </TIMEX3>.

Knowles <EVENT id="e4" class="OCCURRENCE" tense="past" aspect="PERFECTIVE"> released </EVENT> her new album, "When I <EVENT id="e5" class="OCCURRENCE" tense="future" aspect="PERFECTIVE"> Get Home </EVENT>," <TIMEX3 id="t4" type="DATE" value="2020-03" anchorTimeId="t1" functionInDocument="RELEASE\_TIME"> last month </TIMEX3>.

An accomplished singer, songwriter, dancer, DJ and style guru, Knowles Knowles <EVENT id="e6" class="STATE" tense="past" aspect="PERFECTIVE"> graced </EVENT> the Coachella stage <TIMEX3 id="t5" type="DATE" value="2019" anchorTimeId="t1" functionInDocument="RECEPTION\_TIME"> last year </TIMEX3> when she <EVENT id="e7" class="OCCURRENCE" tense="past" aspect="PERFECTIVE"> joined </EVENT> her big sister, Beyoncé, during her historic, headlining tour.

Ariana Grande, Childish Gambino, and Tame Impala are <EVENT id="e8" class="I-STATE" tense="PRESENT" aspect="PROGRESSIVE"> headlining </EVENT> the festival <TIMEX3 id="t6" type="DATE" value="2020" anchorTimeId="t1" functionInDocument="CREATION\_TIME"> this year </TIMEX3>.

Coachella <EVENT id="e9" class=" OCCURRENCE" tense="PRESENT" aspect=" PERFECTIVE\_PROGRESSIVE"> takes place </EVENT> <TIMEX3 id="t7" type="DURATION" value="PnY" functionInDocument="RECEPTION\_TIME"> annually</TIMEX3> over <TIMEX3 id="t7" type="DURATION" value="P2WE" functionInDocument="CREATION\_TIME" anchorTimeID="t6"> two weekends</TIMEX3> in <TIMEX3 id="t8" type="DATE" value="YYYY-04" functionInDocument="CREATION\_TIME" anchorTimeID="t6"> April</TIMEX3> in Indio, California.

- b. Using Allen's definitions of temporal relations, establishing the temporal relations for the text from problem2.

Posted E1 is included in 20 April 2020 T1

Posted E1 simultaneous with Performing E2

Performing E2 included in this year T2

Announce E3 included in Sunday night T3

Released E4 included in last month T4

Released E4 is before Sunday night T3

Graced E6 included in joined E7

Heading E8 included in this year T6

Takes place E9 included in annually T7

Takes place E9 included in two weeks T8

Takes place E9 included in April T9

Takes place E9 included in Performing E2

Takes place E9 included in graced E6

Takes place E9 included in graced E8

- c. Draw the graphical representation of the timeline of the events and temporal expressions in the text.

