

HOMEWORK 3

Problem 1: Word Sense Disambiguation

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.

a. Manual disambiguation of the sentence

Wordnet: Used the online Wordnet Search-3.1 tool for manually disambiguating sense of all words in the given sentence.

The **singer:n#1** will not be **performing:v#3** at this **year's:n#1 festival:n#2 (after all):r#2**.

An **accomplished:a#1 singer:n#1, songwriter:n#1, dancer:n#1, and style:n#1 guru:n#3**, she **graced:v#1** the **festival's:n#2 stage:n#3 last:a#1 year:n#1** when she **joined:v#3** her (**big sister):n#1** during her **historic:a#2, headlining:v#1 tour:n#1**.

Words	Word Sense	Meaning
Singer	(n) singer#1 , vocalist#1, vocalizer#2, vocaliser#2	(a person who sings)
Performing	(v) perform#3	(give a performance (of something))
Year	(n) year#1 twelvemonth#1, yr#1	(a period of time containing 365 (or 366) days)
Festival	(n) festival#2 , fete#2	(an organized series of acts and performances (usually in one place))
After all	(adv) after all#2	(in spite of expectations)
Accomplished	(adj) accomplished#1 , complete#3	(highly skilled)
Songwriter	(n) songwriter#1 , songster#1, ballad maker#1	(a composer of words or music for popular songs)
Dancer	(n) dancer#1 , professional dancer#1, terpsichorean#1	(a performer who dances professionally)
Style	(n) manner#1, mode#1, style#1, way#1, fashion#1	(how something is done or how it happens)
Guru	(n) guru#3	(a recognized leader in some field or of some movement)
graced	(v) decorate#1, adorn#1, grace#1, ornament#1, embellish#3, beautify#3	(make more attractive by adding ornament, colour, etc.)
Stage	(n) stage#3	(a large platform on which people can stand and can be seen by an audience)

last	(adj) last#1	(immediately past)
joined	(v) join#3	(come into the company of)
Big sister	(n) big sister#1	(an older sister)
historic	(adj) historic#2	(important in history)
headlining	(v) headline#1	(publicize widely or highly, as if with a headline)
tour	(n) tour#1 , circuit#2	(a journey or route all the way around a particular place or area)

b. Implement Simple Lesk WSD algorithm.

Output after executing the python program on the given text:

Word : singer

Sentence : 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.

Best sense : Synset('singer.n.01')

Word : performing

Sentence : 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.

Best sense : Synset('acting.n.01')

Word : year

Sentence : 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.

Best sense : Synset('year.n.02')

Word : festival

Sentence : 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.

Best sense : Synset('festival.n.01')

Word : after_all

Sentence : 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.

Best sense : Synset('after_all.r.01')

Word : accomplished

Sentence : 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.

Best sense : Synset('carry_through.v.01')

Word : songwriter

Sentence : 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.

Best sense : Synset('songwriter.n.01')

Word : dancer

Sentence : 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.

Best sense : Synset('dancer.n.01')

Word : style

Sentence : 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.

Best sense : Synset('expressive_style.n.01')

Word : guru

Sentence : 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.

Best sense : Synset('guru.n.01')

Word : graced

Sentence : 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.

Best sense : Synset('decorate.v.01')

Word : stage

Sentence : 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.

Best sense : Synset('stage.v.01')

Word : last

Sentence : 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.

Best sense : Synset('last.n.02')

Word : joined

Sentence : 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.

Best sense : Synset('join.v.02')

Word : big_sister

Sentence : 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.

Best sense : Synset('big_sister.n.01')

Word : historic

Sentence : 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.

Best sense : Synset('historic.s.01')

Word : headlining

Sentence : 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.

Best sense : Synset('headline.v.01')

Word : tour

Sentence : 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.

Best sense : Synset('tour.v.01')

Accuracy: 13 / 18 got classified correctly, hence accuracy is 72.22%.

Problem 2: Information Extraction

Solange Knowles will not be performing at this year's Coachella Music and Arts Festival after all. The music festival's official Twitter account announced the news Sunday night. Knowles released her new album, "When I Get Home," last month. 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. Ariana Grande, Childish Gambino, and Tame Impala are headlining the festival this year. Coachella takes place annually over two weekends in April in Indio, California.

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

[**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 [**ENT the festival**] this year. [**ENT Coachella**] takes place annually over two weekends in April in [**LOC Indio**], [**LOC California**].

Named entity found: **15**

TYPE	COUNT
Persons	7
Locations	2
Entertainment Events	4
Organizations	1
Album Titles	1

b. Use the IOB notation to indicate the labels that you would assign to the text from Problem 2.a.

Sentence 1:

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
's	O
Coachella	B-ENT

Music	I-ENT
And	I-ENT
Arts	I-ENT
Festival	I-ENT
After	O
All	O
.	O

Sentence 2:

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

WORDS	IOB Label
The	B-ENT
Music	I-ENT
Festival	I-ENT
's	O
Official	O
Twitter	B-ORG
Account	O
Announced	O
The	O
News	O
Sunday	O
Night	O
.	O

Sentence 3:

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
Last	O
Month	O
.	O

Sentence 4:

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
.	O

Sentence 5:

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
Tambe	B-PER
Impala	I-PER
Are	O
Headlining	O
The	B-ENT
Festival	I-ENT
This	O
Year	O
.	O

Sentence 6:

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
Indo	B-LOC
,	I-LOC
California	I-LOC
.	O

c. Annotate manually the temporal expressions in the text from Problem 2.a:

Temporal Expression

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.

The document was posted on <TIMEX3>April 14th, 2019</TIMEX3>.

d. Perform temporal normalization of the temporal expressions you have identified in the text from Problem 2.a and produce an annotation of the normalized temporal expressions in the text.

Temporal Normalization

Solange Knowles will not be performing 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 announced the news <TIMEX3 id="t3" type="DATE" value="2019-04-12" anchorTimeId="t1" functionInDocument="RELEASE_TIME">Sunday night</TIMEX3>. Knowles released her new album, "When I Get Home," <TIMEX3 id="t4" type="DATE" value="2019-03" 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="2018" 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="2019" 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.

The document was posted on <TIMEX3 id="t1" type="DATE" value="2019-04-14" functionInDocument="CREATION_TIME">April 14th, 2019</Timex>.

e. Identify in the text from Problem 2.a all the relations:

Manually discovered following relations

[Solange Knowles]_{PER} → Entertainer → [Coachella Music and Arts Festival]_{PER} (**Type 1**)
 [Coachella Music and Arts Festival]_{ENT} → Communicates-through → [Twitter]_{ORG} (**Type 5**)
 [Knowles]_{PER} → Involved-in → [When I Get Home]_{ALB} (**Type 3**)
 [Knowles]_{PER} → Family → [Beyoncé]_{PER} (**Type 2**)
 [Beyoncé]_{PER} → Entertainer → [Coachella Music and Arts Festival]_{ENT} (**Type 1**)
 [Ariana Grande]_{PER} → Entertainer → [Coachella Music and Arts Festival]_{ENT} (**Type 1**)
 [Childish Gambino]_{PER} → Entertainer → [Coachella Music and Arts Festival]_{ENT} (**Type 1**)
 [Tame Impala]_{PER} → Entertainer → [Coachella Music and Arts Festival]_{ENT} (**Type 1**)
 [Coachella Music and Arts Festival]_{ENT} → Happens-in → [Indio, California]_{LOC} (**Type 4**)

Types of Relations	Count
Type 1	5
type 2	1
type 3	1
type 4	1
type 5	1

f. Provide examples of five classes of feature you would use to discover the five types of relations you have identified manually. Select one of your relations and show the feature values that you extract from the text from Problem 2.a for 2 of the five feature you selected. Discuss the classifier you would use for recognizing automatically these relations.

Type	Relation	Description
FAMILY	PER → Family → PER	Knowles → big sister → Beyoncé
LOCATED	ENT → Happens-in → LOC	Coachella → located-in → Indio, California
ORG AFFILIATION	ENT → Communicates-through → ORG	Festival → communicates-through → Twitter
PART-WHOLE (GEOGRAPHY)	LOC → is-a-part of → LOC	Indio → is-a-part of → California
MEMBERSHIP	PER → Involved-in → ORG	Ariana Grande → involved-in → Coachella

EXTRA-CREDIT PROBLEM 1:

a) TimeBank Format

Solange Knowles will not be performing at <TIMEX3 id = "t1" type = "DATE" value="2019" functionInDocument = "MODIFICATION_TIME">this year's</TIMEX3> Coachella Music and Arts Festival after all. The music festival's official Twitter account <EVENT eid = "e1" class = "REPORTING">announced</EVENT> the news <TIMEX3 id = "t2" type = "DAY" value=" Sunday" functionInDocument = "RELEASE_TIME">Sunday night</TIMEX3>. Knowles <EVENT eid = "e2" class = "REPORTING">released</EVENT> her new album, "When I Get Home," <TIMEX3 id = "t3" type = "MONTH" value=" March" functionInDocument = "RELEASE_TIME">last month</TIMEX3>. An accomplished singer, songwriter, dancer, DJ and style guru, Knowles <EVENT eid = "e3" class = "STATE">graced</EVENT> the Coachella stage <TIMEX3 id = "t4" type = "DATE" value="2018" functionInDocument = "RECEPTION_TIME">last year</TIMEX3> when she <EVENT eid = "e4" class = "STATE">joined</EVENT> her big sister, Beyoncé, during her <EVENT eid = "e5" class = "OCCURRENCE">historic</EVENT>, headlining tour. Ariana Grande, Childish Gambino, and Tame Impala are headlining the festival <TIMEX3 id = "t5" type = "DATE" value="2019" functionInDocument = "CREATION_TIME"> this year</TIMEX3>. Coachella takes place <TIMEX3 id = "t6" type = "DURATION" value="PNY" functionInDocument = "CREATION_TIME">annually</TIMEX3> over <TIMEX3 id = "t7" type = "DURATION" value="P2WE" functionInDocument = "CREATION_TIME" anchorTimeID = "t6">two weekends</TIMEX3> <TIMEX3 id = "t8" type = "DURATION" value="P2WE" functionInDocument = "CREATION_TIME" anchorTimeID = "t6">in April</TIMEX3> in Indio, California.

b) Using Allen's Definition:

Announced_{e1} is **simultaneous** this year_{t5}

Released_{e2} is **included** last month_{t3}

Joined_{e4} is **simultaneous** graced_{e3}

Announced_{e1} is **included** in Sunday night_{t2}

Announced_{e1} is **includes** released_{e2}

Graced_{e3} is **before** 2019_{t1}

Historic_{e5} is **simultaneous** graced_{e3}

Released_{e2} is **before** Sunday night_{t2}

Historic_{e5} is **included** last year_{t4}

Graced_{e3} is **included** last year_{t4}

Joined_{e4} is **included** last year_{t4}