NLP Homework 3

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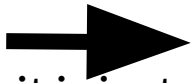
The Options

- Develop a Semantic Role Labeling system
  - with various exciting extensions
- Do a top-secret homework, which:
  - is **innovative** and might lead to a publication
  - a bit more time-intensive (but could be part of your thesis/excellence path/grant)
  - only for very motivated students
- Students who did not pass the Homeworks will have to do a **bigger** project (SRL + extension)



You can achieve top marks with all homework types, it is just a matter of what interests you more.

Option 1

Semantic Role Labeling

Semantic Role Labeling

What is SRL?

1. Identify and disambiguate predicates
    a. e.g. "He ate an apple" --> "He ate/eat.01 an apple"
2. Identify the arguments of a given predicate
    a. "He ate/eat.01 an apple" --> "He ate/eat.01 an apple"
3. Label the roles of the arguments
    a. "He ate/eat.01 an apple" --> "He_**A0** ate/eat.01 an apple_**A1**"

These steps don't necessarily have to be split up and could also be performed jointly.

CoNLL 2009 Dataset

- Dataset for multilingual dependency-based SRL
- 6 languages: English, Catalan, Czech, German, Spanish and Chinese
- Verbal and nominal predicates
- Splits:
  - EN: 1334 dev sentences, 39279 training, 2399 test, 425 out-of-domain test,
  - other languages have similar splits, but they do not have an out-of-domain test set

What is provided in the Dataset?

- lemmatization
- POS tags
- dependency relations
- predicate and argument annotations

CoNLL 2009 Format

1	In	in	in	IN	IN	_	_	10	10	ADV	LOC	_	_	AM-DIS	_	_	_	_
2	any	any	any	DT	DT	_	_	3	3	NMOD	NMOD	_	_	_	_	_	_	_
3	event	event	event	NN	NN	_	_	1	1	PMOD	PMOD	_	_	_	_	_	_	_
4	0	0	0	0	0	_	_	10	10	P	P	_	_	_	_	_	_	_
5	Mr.	mr.	mr.	NNP	NNP	_	_	6	6	TITLE	TITLE	_	_	_	_	_	_	_
6	Englund	englund	englund	NNP	NNP	_	_	10	10	SBJ	SBJ	_	_	A0	_	_	_	_
7	and	and	and	CC	CC	_	_	6	6	COORD	COORD	_	_	_	_	_	_	_
8	many	many	many	DT	JJ	_	_	9	9	NMOD	NMOD	_	_	_	_	_	_	_
9	others	others	others	NNS	NNS	_	_	7	7	CONJ	CONJ	_	_	_	_	_	_	_
10	say	say	say	VBP	VBP	_	_	0	0	ROOT	ROOT	Y	say.01	_	_	_	_	_
11	that	that	that	IN	IN	_	_	10	10	OBJ	OBJ	_	_	A1	_	_	_	_
12	the	the	the	DT	DT	_	_	14	14	NMOD	NMOD	_	_	_	_	_	_	_
13	easy	easy	easy	JJ	JJ	_	_	14	14	NMOD	NMOD	_	_	_	AM-MNR	_	_	_
14	gains	gain	gain	NNS	NNS	_	_	20	20	SBJ	SBJ	Y	gain.01	_	A2	_	_	A1
15	in	in	in	IN	IN	_	_	14	14	NMOD	LOC	_	_	_	A1	_	_	_
16	narrowing	narrow	narrow	VBG	VBG	_	_	15	15	PMOD	PMOD	Y	narrow.01	_	_	_	_	_
17	the	the	the	DT	DT	_	_	19	19	NMOD	NMOD	_	_	_	_	_	_	_
18	trade	trade	trade	NN	NN	_	_	19	19	NMOD	NMOD	_	_	_	_	_	A1	_
19	gap	gap	gap	NN	NN	_	_	16	16	OBJ	OBJ	Y	gap.01	_	_	A1	_	_
20	have	have	have	VBP	VBP	_	_	11	11	SUB	SUB	_	_	_	_	_	_	_
21	already	already	already	RB	RB	_	_	20	20	TMP	ADV	_	_	_	_	_	_	AM-TMP
22	been	be	be	VBN	VBN	_	_	20	20	VC	VC	_	_	_	_	_	_	_
23	made	make	make	VBN	VBN	_	_	22	22	VC	VC	Y	make.01	_	_	_	_	_
24	.	.	.	.	.	_	_	10	10	P	P	_	_	_	_	_	_	_

Word Lemmas POS Dependency Rel. Predicate Arguments and their roles

CoNLL 2004 and 2005 Dataset

- Dataset for (span-based) Semantic Role Labeling

[$_{A0}$ He] [$_{AM\text{-}MOD}$ would] [$_{AM\text{-}NEG}$ n't] [$_{V}$ **accept**] [$_{A1}$ anything of value] from [$_{A2}$ those he was writing about] .

Here, the roles for the predicate **accept** (that is, the *roleset* of the predicate) are defined in the PropBank Frames scheme as:

V: verb
A0: acceptor
A1: thing accepted
A2: accepted-from
A3: attribute
AM-MOD: modal
AM-NEG: negation

- Train: 39832 sentences, Dev: 1346, Test: 2837

CoNLL 2004/5 Format

The	-	(A0*	(A0*
$	-	*	*
1.4	-	*	*
billion	-	*	*
robot	-	*	*
spacecraft	-	*)	*)
faces	face	(V*)	*
a	-	(A1*	*
six-year	-	*	*
journey	-	*	*
to	-	*	*
explore	explore	*	(V*)
Jupiter	-	*	(A1*
and	-	*	*
its	-	*	*
16	-	*	*
known	-	*	*
moons	-	*)	*)
.	-	*	*

What is PropBank?

- PropBank is originally a corpus (Penn Treebank) that has been annotated with information about predicate-argument relations.
- A verb lemma, for example "develop", can be associated with various **frames:** a frame denotes a specific semantic usage of a lemma.
  - e.g. **develop.01** (come about, arisen)**, develop.02** (create, built up)
- These propbank **framesets** come with various **roles**:

ARG0	agent	ARG3	starting point, benefactive, attribute
ARG1	patient	ARG4	ending point
ARG2	instrument, benefactive, attribute	ARGM	modifier

Table 1.1: List of arguments in PropBank

Table 1
Subtypes of the ArgM modifier tag.

LOC: location	CAU: cause
EXT: extent	TMP: time
DIS: discourse connectives	PNC: purpose
ADV: general purpose	MNR: manner
NEG: negation marker	DIR: direction
MOD: modal verb	

Palmer, Martha, Daniel Gildea, and Paul Kingsbury. "The proposition bank: An annotated corpus of semantic roles." *Computational linguistics* 31.1 (2005): 71-106.

An Example of two PropBank frames with their roles:

Frameset **cut.01** "slice"

Arg0: cutter

Arg1: thing cut

Arg2: medium, source

Arg3: instrument

Ex: [$_{Arg0}$ Longer production runs] [$_{ArgM\text{-}MOD}$ would] *cut* [$_{Arg1}$ inefficiencies from adjusting machinery between production cycles]. (wsj_0317)

Frameset **cut.04** "cut off = slice"

Arg0: cutter

Arg1: thing cut (off)

Arg2: medium, source

Arg3: instrument

Ex: [$_{Arg0}$ The seed companies] *cut off* [$_{Arg1}$ the tassels of each plant]. (wsj_0209)

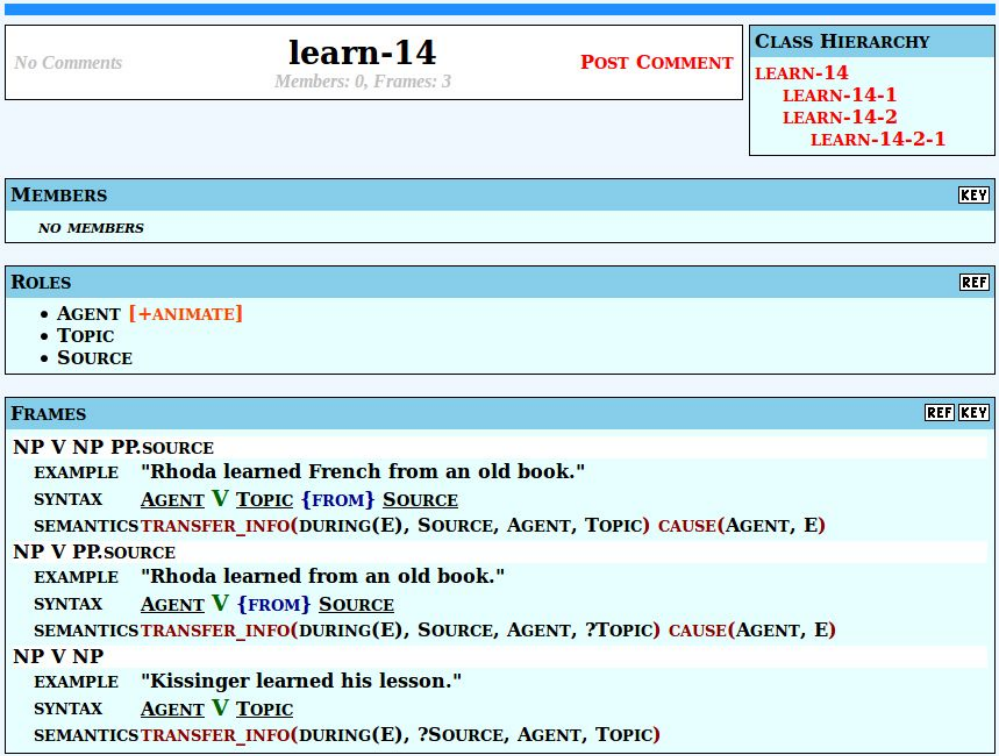
Palmer, Martha, Daniel Gildea, and Paul Kingsbury. "The proposition bank: An annotated corpus of semantic roles." *Computational linguistics* 31.1 (2005): 71-106.

What is VerbNet?

- an online, hierarchical verb lexicon, containing verb classes
  - Verb Classes are clusters of verbs which share a common argument structure
- while PropBank is part of a corpus, this resource is only a lexicon without a corpus
- the verbs and roles differ from PropBank, but are linked through SemLink
- a verb class contains
  - syntactic frames:
    - *Agent V patient*
  - thematic roles:
    - *Agent*, *Theme*, *Location* etc.
    - used across classes
  - selectional restrictions (define the thematic roles):
    - *Patient [+comestible & +solid]*

Schuler, Karin Kipper. "Verbnet: a broad-coverage, comprehensive verb lexicon." (2005).

An example of a VerbNet class



No Comments

learn-14

Members: 0, Frames: 3

POST COMMENT

CLASS HIERARCHY

LEARN-14
- LEARN-14-1
- LEARN-14-2
  - LEARN-14-2-1

MEMBERS KEY

NO MEMBERS

ROLES REF

- AGENT [+ANIMATE]
- TOPIC
- SOURCE

FRAMES REF KEY

NP V NP PP.SOURCE

EXAMPLE "Rhoda learned French from an old book."

SYNTAX AGENT V TOPIC {FROM} SOURCE

SEMANTICS TRANSFER_INFO(DURING(E), SOURCE, AGENT, TOPIC) CAUSE(AGENT, E)

NP V PP.SOURCE

EXAMPLE "Rhoda learned from an old book."

SYNTAX AGENT V {FROM} SOURCE

SEMANTICS TRANSFER_INFO(DURING(E), SOURCE, AGENT, ?TOPIC) CAUSE(AGENT, E)

NP V NP

EXAMPLE "Kissinger learned his lesson."

SYNTAX AGENT V TOPIC

SEMANTICS TRANSFER_INFO(DURING(E), ?SOURCE, AGENT, TOPIC)

What you have to do for Option 1:

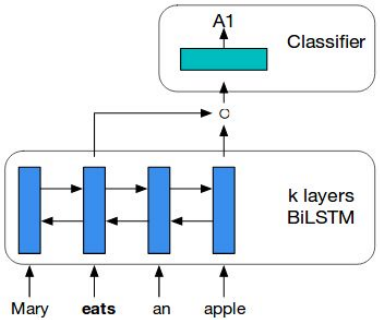


Figure 2: Predicting an argument and its label with an LSTM encoder.

1. Develop a Semantic Role Labeling model that takes as input the disambiguated predicate and its sentence and finds and labels its arguments.
   a. Luca **loves_love.01** Anna --> **Luca_A0, Anna_A1**

A model for example could look like the one to the left.

(Marcheggiani, Diego, Anton Frolov, and Ivan Titov. "A Simple and Accurate Syntax-Agnostic Neural Model for Dependency-based Semantic Role Labeling." *Proceedings of the 21st Conference on Computational Natural Language Learning (CoNLL 2017)*. 2017.)

Extension Idea 1.1

- Disambiguate the dataset (extra points if you successfully use the system you built for Homework 2)
  - use the semantic information to improve your SRL classifier
  - AND
  - successfully include sense or synset embeddings in your system (http://lcl.uniroma1.it/sensembed/ or http://lcl.uniroma1.it/nasari)
- Develop a neural architecture that goes beyond a standard LSTM:
  - use an autoencoder
  - OR use Attention and biLSTMs
  - OR use multi-task learning
  - OR graph-convolutional NN (https://arxiv.org/pdf/1703.04826.pdf)(attention, very hard)

Extension Idea 1.2

- Implement a good **predicate** identification and disambiguation system:
  - Luca loves Anna. --> **love.01**
- <u>How:</u>
  - disambiguate the English CoNLL training data (extra points if you use your HW2 system) and create an alignment between PropBank predicate sense and BabelNet synset
  - Given this alignment, train a predicate disambiguator on SemCor
  - Test your predicate identifier and disambiguator on the English CoNLL test data and see whether it improves when you add the additional SemCor training data, instead of only training on CoNLL

Extension Idea 1.3

- Automatically define the **selectional preference of PropBank predicates and their arguments**
- Take the CoNLL corpus, disambiguate it and collect all lemmas and their synsets for a given argument of a given predicate:
  - e.g. : eat.01 - A1 : [apple/bn:00005054n, pizza/bn:00062694n, cucumber/bn:00024294n]
- Given these sets of predicates-arguments-roles:
  - find ways to generalize:
    - e.g. clustering, centroids, hypernyms, distributional methods
- With these generalizations you have semantically defined the selectional preferences of PropBank
  - In the end you want to have an output similar to the Selectional Preferences of VerbNet:
    - e.g. eat.01 - A1 : food (you can choose what set of selectional preferences you want to define)

Language: up to you!

- you can choose one of the following languages in the CoNLL dataset :
  - English
  - Spanish
  - Chinese
  - Czech

Evaluation

- You can evaluate your system on the CoNLL 2009 dev split.
- We will give you the unlabeled test split which you have to label and hand in.
- Please mention: F1, Accuracy, Precision, Recall
- Include a confusion matrix
- The following numbers can give you an idea about current state-of-the-art (you do not have to achieve SOTA to get full marks, don't worry!)

Language	Precision	Recall	F1
ES	81.4	79.3	80.3
EN	88.7	86.8	87.7
ZH	83.4	79.1	81.2
CS	86.6	85.4	86.0

What you have to do to get which grade:

- If you develop the mandatory task : maximum grade **27**
  - **Report 50%**
  - **Novelty 20%**
  - **Performance 20%**
  - **Code 10%**
- If you develop the mandatory task and implement one of the extensions proposed: maximum grade **35**
  - **Report 50%**
  - **Novelty 20%**
  - **Performance 20%**
  - **Code 10%**

What you have to submit:

- A **report**:
  - up to 4 pages (+infinite pages for references, images, tables, graphs, etc.)
  - including: a brief introduction to the project problem, a brief state of the art, an illustration of the methods/approach/techniques (min. 1 page), a quantitative (and ideally a small qualitative) evaluation of the system, some analysis of the results.
- Your **source code** via a **gitlab project (developer permission to us)**
- The output of your system on the test data.
- You will also have to present your work in a **presentation**
- Submission form **HERE**

Test data output format

- We will provide you with the test data, without the labels
- You have to label the test data in the CoNLL format:
  - You have to fill in the all the columns after the predicate column nr. 14

ID	FORM	LEMMA	PLEMMA	POS	PPOS	FEAT	PFEAT	HEAD	PHEAD	DEPREL	PDEPREL	FILLPRED	PRED	APRED1	APRED2	APRED3	APRED4	APRED5
1	W.	w.	w.	NNP	NNP	_	_	3	3	NAME	NAME	_	_	_	_	_	_	_
2	Ed	ed	ed	NNP	NNP	_	_	3	3	NAME	NAME	_	_	_	_	_	_	_
3	Tyler	tyler	tyler	NNP	NNP	_	_	18	18	SBJ	SBJ	_	_	_	_	A1	_	_
4	,	,	,	,	,	_	_	3	3	P	P	_	_	_	_	_	_	_
5	37	37	37	CD	CD	_	_	6	6	NMOD	NMOD	_	_	_	_	_	_	_
6	years	year	year	NNS	NNS	_	_	7	7	AMOD	AMOD	_	_	_	_	_	_	_
7	old	old	old	JJ	JJ	_	_	3	3	NMOD	NMOD	_	_	_	_	_	_	_
8	,	,	,	,	,	_	_	3	3	P	P	_	_	_	_	_	_	_
9	a	a	a	DT	DT	_	_	12	12	NMOD	NMOD	_	_	_	_	_	_	_
10	senior	senior	senior	JJ	JJ	_	_	12	12	NMOD	NMOD	_	_	A3	_	_	_	_
11	vice	vice	vice	NN	NN	_	_	12	12	NMOD	NMOD	_	_	A3	_	_	_	_
12	president	president	president	NN	NN	_	_	3	3	APPO	APPO	Y	president.01	A0	_	_	_	_
13	at	at	at	IN	IN	_	_	12	12	LOC	LOC	_	_	A2	_	_	_	_
14	this	this	this	DT	DT	_	_	16	16	NMOD	NMOD	_	_	_	_	_	_	_
15	printing	print	print	VBG	VBG	_	_	16	16	NMOD	NMOD	_	_	_	A1	_	_	_
16	concern	concern	concern	NN	NN	_	_	13	13	PMOD	PMOD	Y	concern.02	_	A0	_	_	_
17	,	,	,	,	,	_	_	3	3	P	P	_	_	_	_	_	_	_
18	was	be	be	VBD	VBD	_	_	0	0	ROOT	ROOT	_	_	_	_	_	_	_
19	elected	elect	elect	VBN	VBN	_	_	18	18	VC	VC	Y	elect.01	_	_	_	_	_
20	president	president	president	NN	NN	_	_	19	19	OPRD	OPRD	Y	president.01	_	_	A2	A0	_
21	of	of	of	IN	IN	_	_	20	20	NMOD	NMOD	_	_	_	_	_	A2	_
22	its	its	its	PRP$	PRP$	_	_	24	24	NMOD	NMOD	_	_	_	_	_	_	A2
23	technology	technology	technology	NN	NN	_	_	24	24	NMOD	NMOD	_	_	_	_	_	_	A1
24	group	group	group	NN	NN	_	_	21	21	PMOD	PMOD	Y	group.01	_	_	_	_	_
25	,	,	,	,	,	_	_	20	20	P	P	_	_	_	_	_	_	_
26	a	a	a	DT	DT	_	_	28	28	NMOD	NMOD	_	_	_	_	_	_	_
27	new	new	new	JJ	JJ	_	_	28	28	NMOD	NMOD	_	_	_	_	_	_	_
28	position	position	position	NN	NN	_	_	20	20	APPO	APPO	Y	position.02	_	_	_	_	_
29	.	.	.	.	.			18	18	P	P							

Option 2

Innovative Homework 3

General Idea

- You will receive a newly created multilingual **predicate inventory**
- There is no available training data for this inventory (like for example CoNLL for PropBank)
- You will have to create labeled sentences by:
  - leveraging example sentences, the inventory and the selectional preferences/types from the inventory, using CoNLL
- You train a supervised system on the new training data that you created
- You will evaluate on a test set of manually labeled sentences provided by us

Why is this interesting to do?

- You will work on a novel approach which might lead to a publication!
- You aim to resolve the knowledge-acquisition bottleneck by:
  - creating new training data!
  - working on a language-independent inventory
  - have access to a knowledge base (BabelNet)

Introduction to the Predicate Inventory by Andrea Di Fabio

The predicate inventory and its innovation

- It is completely **multilingual**/language-independent!
  - All the inventories we previously presented (PropBank, VerbNet, FrameNet etc.) are language-specific
  - This allows: multilingual learning and knowledge interchange between languages
- It is **synset**-based and therefore connected to **BabelNet**
  - Does not stand isolated
  - You can make use of this additional knowledge-base

Predicate Inventory

- multilingual verb clusters, containing:
  - **Argument structure** of the clusters containing synsets with similar semantic
  - **Semantic roles** inspired to VerbNet which can occur within the instances of verb synsets in the cluster
  - **Selectional preferences** to identify the most probable lexical arguments connected through BabelNet IDs to the WordNet hierarchy
  - **Internal arguments** tagged with BabelNet IDs to explicit the implicit lexical information of the synset

Example of the EAT cluster

	A	B	C	D	E	F	G
1	SYNSET	Nome cluster	n° o	Struttura argomentale	iARG	Esempi	P
1250	un agent mangia un patient [in una location]			1) Agent (person | animal), patient (food), [location ()]; 2) Agent (person | animal), patient (physical_object), [location ()]			
1251	bn:00083503v	EAT, BITE	51		iPatient (food, bn:00035649n)	She stuffed herself at the dinner	1
1252	bn:00083752v	EAT, BITE	51			NO EXAMPLE	1
1253	bn:00083753v	EAT, BITE	51			Don't bolt your food!	1
1254	bn:00083755v	EAT, BITE	51			The children gobbled down most of the birthday cake	1
1255	bn:00085688v	EAT, BITE	51			Some people can down a pound of meat in the cours	1
1256	bn:00085689v	EAT, BITE	51			Have another bowl of chicken soup!	
1257	bn:00086765v	EAT, BITE	51			he devoured three sandwiches	1
1258	bn:00087460v	EAT, BITE	51			She was eating a banana	1
1259	bn:00087461v	EAT, BITE	51		IPatient (meal, bn:00053993n)	We did not eat until 10 P.M. because there were so m	1
1260	bn:00087462v	EAT, BITE	51		agent (animal, bn:00004222n)	This dog doesn't eat certain kinds of meat	1
1261	bn:00084764v	EAT, BITE	51			NO EXAMPLE	1
1262	bn:00084765v	EAT, BITE	51			The boy chomped his sandwich	1
1263	bn:00084843v	EAT, BITE	51			chaw tobacco	2
1264	bn:00084888v	EAT, BITE	51			He jawed his bubble gum	1
1265	bn:00086112v	EAT, BITE	51			The children crunched the celery sticks	1
1266	bn:00088911v	EAT, BITE	51			gnaw an old cracker	1
1267	bn:00089118v	EAT, BITE	51			the old man had no teeth left and mumbled his food	1
1268	bn:00084145v	EAT, BITE	51	-patient	iPatient (food, bn:00035649n), agent (an	the herd was grazing	1
1269	bn:00084147v	EAT, BITE	51			There was so much food at the party that we quickly g	1
1270	bn:00084464v	EAT, BITE	51		patient (bn:00035182n)	NO EXAMPLE	1
1271	bn:00086815v	EAT, BITE	51			The food was placed on the table and the children pit	1
1272	bn:00087468v	EAT, BITE	51			She polished off the remaining potatoes	1
1273	bn:00088039v	EAT, BITE	51	-patient	iPatient (food, bn:00035649n)	NO EXAMPLE	1
1274	bn:00088181v	EAT, BITE	51			He filled up on turkey	1
1275	bn:00088449v	EAT, BITE	51		iPatient (food, bn:00035649n), agent (an	The animals forage in the woods	1
1276	bn:00088574v	EAT, BITE	51			NO EXAMPLE	1
1277	bn:00088759v	EAT, BITE	51			Swallow the raw fish--it won't kill you!	1

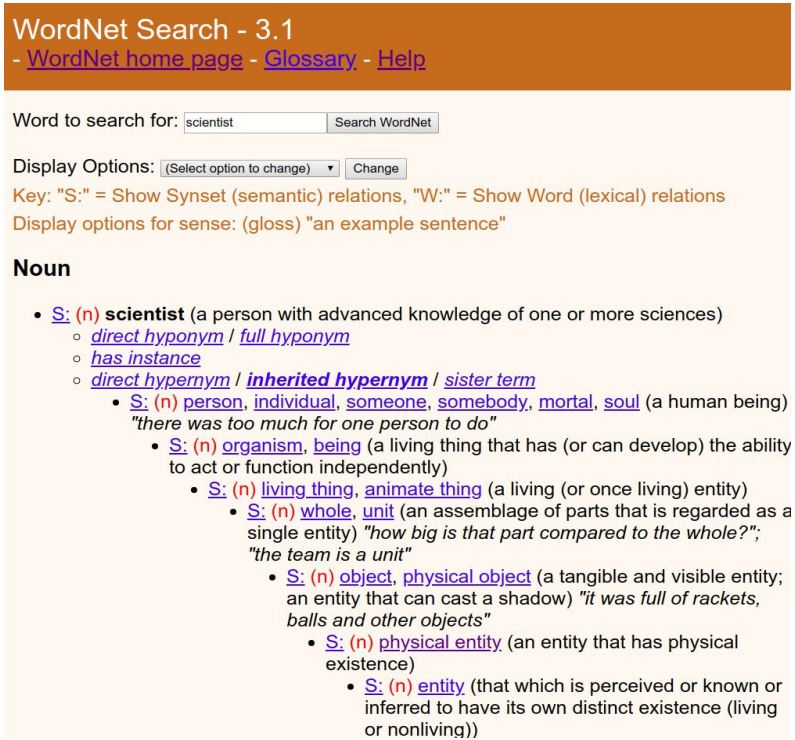
Example of the EAT cluster

	Esempi	P	Glossa	Lemmi
1250	**rson | animal), patient (physical_object), [location ()]**			
1251	She stuffed herself at the dinner	1	Overeat or eat immodestly; make a pig of oneself	gorge · engorge · glut · ingurgitate ·overeat
1252	NO EXAMPLE	1	Swallow hastily	bolt
1253	Don't bolt your food!	1	Eat hastily without proper chewing	gobble · bolt · gorge · devour ·engorge
1254	The children gobbled down most of the birthday cake	1	Eat a large amount of food quickly	bolt down · garbage down · gobble up ·shovel in
1255	Some people can down a pound of meat in the cours	1	Eat immoderately	consume · devour · down · go through
1256	Have another bowl of chicken soup!		Serve oneself to, or consume regularly	ingest · take · consume · have · take in
1257	he devoured three sandwiches	1	Eat greedily	devour · guttle · pig · raven
1258	She was eating a banana	1	Take in solid food	eat · consume
1259	We did not eat until 10 P.M. because there were so m	1	Eat a meal; take a meal	eat · consume
1260	This dog doesn't eat certain kinds of meat	1	Take in food; used of animals only	feed · eat
1261	NO EXAMPLE	1	Chafe at the bit, like horses	champ
1262	The boy chomped his sandwich	1	Chew noisily	champ · chomp
1263	chaw tobacco	2	Chew without swallowing	chaw
1264	He jawed his bubble gum	1	Chew (food); to bite and grind with the teeth	chew · masticate · jaw · manducate
1265	The children crunched the celery sticks	1	Chew noisily	crunch · munch
1266	gnaw an old cracker	1	Bite or chew on with the teeth	gnaw
1267	the old man had no teeth left and mumbled his food	1	Grind with the gums; chew without teeth and with gr	gum · mumble
1268	the herd was grazing	1	Feed as in a meadow or pasture	browse · graze · crop · pasture · range
1269	There was so much food at the party that we quickly g	1	Eat lightly, try different dishes	browse · graze
1270	NO EXAMPLE	1	Eat human flesh	cannibalise · cannibalize
1271	The food was placed on the table and the children pit	1	Eat heartily	dig in · pitch in
1272	She polished off the remaining potatoes	1	Finish eating all the food on one's plate or on the tal	eat up · finish · polish off
1273	NO EXAMPLE	1	Eat well	fare
1274	He filled up on turkey	1	Eat until one is sated	fill · fill up
1275	The animals forage in the woods	1	Wander and feed	forage
1276	NO EXAMPLE	1	Eat a lot and without restraint	fress · gluttonize · gluttonise
1277	Swallow the raw fish--it won't kill you!	1	Pass through the esophagus as part of eating or dri	swallow · get down

Selectional preferences

Selectional preferences	SYNSET
absorbent	bn:00000467n
activity	bn:00001172n
animal	bn:00004222n
animate_being	bn:00004222n
art	bn:00005926n
artifact	bn:00005956n
authority	bn:00007300n
belief	bn:00009716n
body_process	bn:00001173n
communication	bn:00021222n
conduit	bn:00062568n
container	bn:00022129n
determination	bn:00026651n
event	bn:00032021n
human	bn:00044576n
instructions	bn:00027356n
knowledge	bn:00020452n

BabelNet to WordNet hierarchy



WordNet Search - 3.1
- WordNet home page - Glossary - Help

Word to search for: scientist Search WordNet

Display Options: (Select option to change) Change

Key: "S:" = Show Synset (semantic) relations, "W:" = Show Word (lexical) relations

Display options for sense: (gloss) "an example sentence"

Noun

- S: (n) **scientist** (a person with advanced knowledge of one or more sciences)
  - *direct hyponym* / *full hyponym*
  - *has instance*
  - *direct hypernym* / ***inherited hypernym*** / *sister term*
    - S: (n) person, individual, someone, somebody, mortal, soul (a human being) *"there was too much for one person to do"*
      - S: (n) organism, being (a living thing that has (or can develop) the ability to act or function independently)
        - S: (n) living thing, animate thing (a living (or once living) entity)
          - S: (n) whole, unit (an assemblage of parts that is regarded as a single entity) *"how big is that part compared to the whole?"; "the team is a unit"*
            - S: (n) object, physical object (a tangible and visible entity; an entity that can cast a shadow) *"it was full of rackets, balls and other objects"*
              - S: (n) physical entity (an entity that has physical existence)
                - S: (n) entity (that which is perceived or known or inferred to have its own distinct existence (living or nonliving))

What you have to do for Option 2

Option 2.1

- Take SemCor, which is **annotated** with senses
- Extract all sentences which contain a verb sense from the predicate inventory clusters
- Label these sentences with the roles pertaining to the specific verb cluster:
  - HOW? Up to you.. Some ideas:
    - Exploit the selectional preferences
    - Use dependency parsing
    - Exploit the WordNet hierarchy

Option 2.2

- Use CoNLL 2009, which is already annotated with predicates and roles, but from a different inventory
- By disambiguating CoNLL 2009, learn a mapping from PropBank predicate to BabelNet predicate (from the clusters) and also learn a mapping from PropBank roles to cluster roles
- Use this mapping to train a system on the CoNLL sentences, labeled with the predicates and arguments from the new predicate inventory

Evaluation

- You can evaluate your system on gold standard sentences provided by us
- Please mention: F1, Accuracy, Precision, Recall
- Include a confusion matrix

Group work

- if you want you can work in groups of 2 (or alone)

How we will grade

- up to 30 if you come up with a working system and labeled sentences
  - **Report 50%**
  - **Novelty 20%**
  - **Performance 20%**
  - **Code 10%**
- 30+ if you have a novel approach and produce good quality labeled sentences.

NLP Project for non-attending students

Federico Scozzafava & Valentina Pyatkin & Roberto Navigli

(scozzafava | pyatkin | navigli)@di.uniroma1.it

Your Task

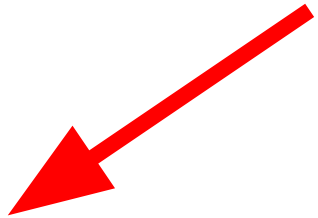
- You implement:
  - A **predicate disambiguation** system
  - A **semantic role labeling** system (see extra task 1.2)
- And do 1 of the two other extra tasks (extra task 1.1 and 1.3)
- Refer to the slides in Option 1 to see how you have to do this.

How we will grade

- If you implement the two systems and one extension you can get up to 30.
  - **Report 50%**
  - **Novelty 20%**
  - **Performance 20%**
  - **Code 10%**
- If you add something extra on top 30+

Administrative Stuff

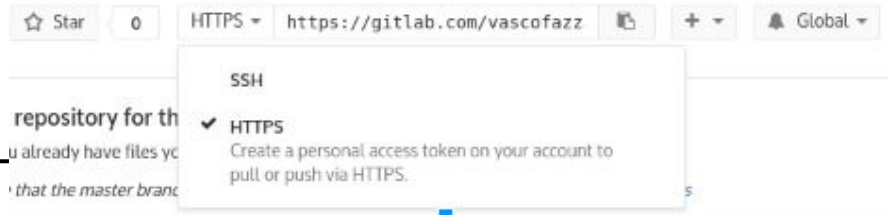
Submission



- Fill out the **GOOGLE FORM :** https://docs.google.com/forms/d/14jzy1jf3BfMHY82l8T3jhWsKx1Ws9AXJTHupl3DA-08/edit
- The google form contains instructions on how to submit your report and your source code.

Source code submission

- Register to GitLab.com and create a new project
- Name the project **firstname_lastname_matricola_nlp18hw3**
- Share the project with (project setting -> members):
  - pyatkin@di.uniroma1.it
  - federico.scozzafava@gmail.com
  - navigli@di.uniroma1.it
- **Give us developer permissions**
- Upload your code on the repository
- Get the **HTTP URL**



Deadlines

- Please check http://naviglinlp.blogspot.it/p/natural-language-processing-basic.html for submission and presentation dates.
- For those doing the HW:
  - there are 3 possible submission dates
  - 1 week after you submission you will have to present your HW with a presentation
- For those doing the project:
  - you have 5 possible submission dates
  - 1 week after you submission you will have to present your project with a presentation

The presentation

- Presentation will be done in classroom with slides.
- Each student will have a maximum time of 10 minutes for presentation (strict) + 10 minutes for questions from the Professor
- You should present a summary of your work on the slides
  - make a presentation out of your report

FINAL GRADE

- Your homework 3 will be graded by us and after the presentation, Prof. Navigli will set your final grade
- If you did all the Homeworks your final grade will be the average of the three
- For those doing the big project: this will be your only and final grade, determined by the submission and the presentation.

Good Luck!