

AUTOMATIC EXTRACTION OF SUBCATEGORIZATION FRAMES FROM CORPORA IN PORTUGUESE

Leonardo Zilio (PPG-Letras/UFRGS)

Adriano Zanette (PPG-Computação/UFRGS)

Carolina Scarton (CCMC/USP)

OUR GOALS

- To present a tool for automatic extraction of subcategorization frames (SCFs) designed specially for Portuguese
- To show some early results of two different studies which use this tool

WHAT IS AN SCF?

- Syntactic representation of a **clause** or **phrase**.

CLAUSE REPRESENTATION

- Clause
 - Marcou o gol que deu sobrevida a o time , deu carrinhos e conduziu a equipe com uma qualidade que nenhum outro jogador apresentou – nem=de=longe .

NP_NP

PHRASE REPRESENTATION

- Phrase
 - Privação de liberdade

SN_SP[de]

OUR EXTRACTOR

- Initially developed by Zanette (2010)
- Improved in 2011-2012 (Zanette et al. 2012)
- Extracts SCFs of clauses
- http://143.107.232.109/scf_port/index.html

HOW IT WORKS

- 1 - Input: corpora annotated with the parser PALAVRAS (Bick, 2000)
 - Dependency trees
 - 2 - Processing of all sentences in the corpora
 - 3 - Extraction of all dependencies of main verbs verbs
 - 4 - Analysis of the relevant dependencies (exclusion of adverbs)
 - 5 – Output: Database of subcategorization frames
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WORKS IN PROGRESS

Verb Lexicon

VERB LEXICON

- Building of VerbNet.br (Scarton, 2011)
- Grouping verbs according to syntactic patterns - according to Levin (1993)
- Changed the original frame:
 - O homem quebrou a janela com um martelo
(The man broke the window with a hammer)
 - **SUBJ[NP] V NP PP[com]**

VERB LEXICON

- Corpora:
 - Lácio-Ref (~9 million words) – (Aluisio 2004)
 - PLN-BR (~26 million words) – (Bruckschen 2008)
 - Revista FAPESP (~6 million words) – (Aziz and Specia 2011)

VERB LEXICON

- Two approaches:
 - Validating a semiautomatic method used to build VerbNet.Br (by using others Computational Lexical Resources)
 - Verb clustering (complete automatic method based on Machine Learning)
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VERB LEXICON

- VerbNet.Br:
 - Based on VerbNet (Kipper, 2005)
 - Being built through the alignments among VerbNet, WordNet and WordNet.Br
 - The SCFs are used to validate the candidate members identified by the others resources
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VERB LEXICON

- Method for building VerbNet.Br:
 - Identify candidate members to VerbNet classes through use of alignments among VerbNet, WordNet and WordNet.Br
 - For each candidate member, identify the SCFs
 - Compare with the SCFs defined manually for each class
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VERB LEXICON

- Verb Clustering (Sun et al., 2010):
 - Use of the syntactic patterns to group verbs together → **MACHINE LEARNING METHODS**
 - Trying to validate Levin's hypothesis → "Verbs that fall into classes according to shared (syntactic) behavior would be expected to show shared meaning components"

VERB LEXICON

- Results
 - Identified:
 - 7.252 verbs
 - 17.448 frames (parameterized by prepositions – frequency higher than 1)
- Verb Clustering:
 - The best result: 42.6% of F-measure (using Spectral Cluster algorithm) for the task in a gold standard with 12 classes of VerbNet (translated from English)
 - The best result for English: 63.3% of F-measure (using Spectral Cluster algorithm)

WORKS IN PROGRESS

Semantic Role Labeling

SEMANTIC ROLES

- The butcher cuts the meat.
 - The butcher = **agent**
 - The meat = **patient/theme**
 - I opened the door with a key.
 - I = **agent**
 - The door = **patient/theme**
 - With a key = **instrument**
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SEMANTIC ROLE LABELING

- Two corpora:
 - Cardiology = 1.5+ million words
 - Newspaper = 1+ million words
 - Semantic roles from the works of Brumm (2008) and Gelhausen (2010)
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INTERFACE

A thin, horizontal line of orange-yellow light that glows and fades out at both ends, positioned directly below the word "INTERFACE".

PHP-INTERFACE 1 – LIST OF VERBS

Verbs

Listagem de verbos

Frequency

Show frames (next slide)

Primeira « 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 » Última

Verbo	Frequência	Ver Frames
ser	12556	
ter	4355	
estar	3968	
fazer	2597	
ficar	1638	
dizer	1309	
dar	1132	
querer	1020	
haver	976	
ir	823	

PHP-INTERFACE 2 – LIST OF FRAMES

Frames do verbo 'encontrar'

Active/Passive
Voice

Show examples
(next slide)

Frames

Frequency

Primeira « 1 2 3 » Última

Frame	Forma	Frequência	Ver Exemplos
NP_NP	ATIVA	68	
NP	PASSIVA	35	
NP_NP_PP[em]	ATIVA	35	
NP_PP[em]	PASSIVA	30	
NP_PP[em]	ATIVA	21	
NP	ATIVA	17	
NP_NP_ADJP	ATIVA	13	

PHP-INTERFACE 3 – LIST OF EXAMPLES

Exemplos do frame 'NP_NP_PP[para]' do verbo 'levar'

Sentence **Arguments** **Sintatic classification**

Primeira « 1 » Última
Exemplo 1 2

Débora leva o cenógrafo Astolfo para arrumar a oficina para as fotos .

+ Mostrar anotação

ARG_1	Débora	SUJEITO	agente
ARG_2	o cenógrafo Astolfo	OBJETO DIRETO	Selecione
ARG_3	para arrumar a oficina para as fotos	ADJUNTO ADVERBIAL	agente

Exemplo 2

Depois de ele , levou 34 anos para o time de Diego e Robinho faturar o Brasileiro , em 2002 .

+ Mostrar anotação

ARG_1	OCULTO	SUJEITO	Selecione
ARG_2	34 anos	OBJETO DIRETO	Selecione
ARG_3	para o time de Diego Robinho	ADJUNTO ADVERBIAL	Selecione

Selecione
agente
paciente
acao
experienciador
experienciado
estimulo
beneficio
beneficiante
beneficiado
possuidor
posse
donatario
recipiente
dimensao geografica
local
local de origem
local de destino
trajeto
dimensao temporal

SEMANTIC ROLE LABELING

Exemplos do frame 'NP_NP_PP[para]' do verbo 'levar'

Primeira « 1 » Última

Exemplo 1 ✕

Débora leva o cenógrafo Astolfo para arrumar a oficina para as fotos .

+ Mostrar anotação

ARG_1	Débora	SUJEITO	agente	
ARG_2	o cenógrafo Astolfo	OBJETO DIRETO		
ARG_3	para arrumar a oficina para as fotos	ADJUNTO ADVERBIAL		

Exemplo 2 ✕

Depois de ele , levou 34 anos para o time de Diego e Robinho faturar o Brasileiro , em 2002 .

+ Mostrar anotação

ARG_1	OCULTO	SUJEITO		
ARG_2	34 anos	OBJETO DIRETO		
ARG_3	para o time de Diego Robinho	ADJUNTO ADVERBIAL		

Built-in click-and-choose drop-box with all semantic roles

- agente
- Selecione
- agente
- paciente
- acao
- experienciador
- experienciado
- estimulo
- beneficio
- beneficiante
- beneficiado
- possuidor
- posse
- donatario
- recipiente
- dimensao geografica
- local
- local de origem
- local de destino
- trajeto
- dimensao temporal

CURRENT SEMANTIC ROLE LABELING

- 46 semantic roles (Brumm 2008; Gelhausen 2010)
- Annotation of 4 verbs in both corpora:
 - encontrar [to find]
 - levar [to take/carry]
 - receber [to receive]
 - usar [to use]
- Test in a small set of verbs

RESULTS

- Annotation of 482 frames
 - 138 different semantic roles configurations
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CURRENT DEVELOPMENTS

- Too many roles, some are not used or are too specific
- Change of the semantic roles set
- Testing of the set applied at the VerbNet (Kipper 2005)

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MUITO OBRIGADO!

Leonardo Zilio

lzilio@ig.com.br