

Die Parallel Meaning Bank

Kilian Evang, Christian Wurm

Düsseldorf, 22.12.2022

Einleitung

- ▶ Großes, tiefensemantisch annotiertes Korpus
- ▶ Teilweise parallel: Englisch, Deutsch, Italienisch, Niederländisch, neuerdings auch Chinesisch, Japanisch, Französisch
- ▶ Im Aufbau seit 2015, aktuelles Release 4.0.0
- ▶ Vorgängerin: Groningen Meaning Bank (nur Englisch, 2010–2015)
- ▶ Zweck: Semantic Parsing, empirische Untersuchung des Syntax-Semantik-Interface verschiedener Sprachen...
- ▶ Überwiegend freie Texte verschiedener Genres: Nachrichtenmeldungen, Fabeln, Tatoeba...

Methodik

- ▶ Semiautomatische Annotation
 - ▶ eine NLP-Pipeline kreiert Vorannotationen
 - ▶ Annotator*innen korrigieren diese
- ▶ Dokumente in Releases haben verschiedene Status:
 - ▶ bronze = nur automatische Vorannotation
 - ▶ silver = ein Mensch hat mindestens eine Sache korrigiert (und wenn es eklatante Fehler gäbe, hätte er*sie sie vermutlich direkt mitkorrigiert)
 - ▶ gold = ein Mensch hat markiert, dass alle Annotationsschichten korrekt sind

Annotationschichten (1/2)

- ▶ Baumbanken wie Penn Treebank oder Universal Dependencies annotieren „nur“ Syntax
- ▶ PropBank annotiert „nur“ semantische Frames und Rollen
- ▶ PMB annotiert sehr viele Schichten
- ▶ Teilweise sind sie ein „Nebenprodukt“ der NLP-Pipeline, die für die Vorannotation genutzt wird
- ▶ Letztlich wird alle Information in die DRS integriert, die am Ende herauskommt

Annotationschichten (2/2)

1. Segmentierung (in Sätze und Tokens)
2. Semantische Tags (ähnlich wie POS-Tags, aber ohne morphosyntaktische Information, sondern semantische Funktion, insbesondere für Funktionswörter wichtig)
3. Synset (nach WordNet, feinkörnige Unterscheidung der Wortbedeutung von Inhaltswörtern)
4. Semantische Rollen
5. Skopus
6. Anaphora
7. CCG-Kategorien

Integration der Annotationschichten

1. Basierend auf den CCG-Kategorien baut EasyCCG (Lewis and Steedman, 2014) eine Derivation für jeden Satz
2. Basierend auf allem baut Boxer (Bos, 2015) eine DRS für jedes Dokument
 - 2.1 weist Tokens λ -DRSs zu (basierend auf Kategorien, semantischen Tags, Synsets, semantischen Rollen)
 - 2.2 berechnet Semantik für Satz (deterministisch anhand Derivation)
 - 2.3 wendet leeren Modifizierer an (Resultat: DRS ohne λ -Abstraktion)
 - 2.4 löst Anaphern auf (basierend auf Anaphern-Annotation)
 - 2.5 integriert DRSEn in eine große DRS mit Diskursrelationen

Ausgabeformate

- ▶ Discourse Representation Structure (box notation)
- ▶ Discourse Representation Structure (clause notation)
- ▶ Discourse Representation Graph (graph notation)
- ▶ Discourse Representation Graph (sequence notation)

PMB-basierte Forschung

- ▶ Theoretische Semantik
- ▶ Semantic Parsing
- ▶ Textgenerierung
- ▶ Semantic Tagging und Vektorrepräsentationen

<https://pmb.let.rug.nl/publications.php>

PMB Explorer

The screenshot shows the PMB Explorer interface. At the top left is the logo for the Parallel Meaning Bank. The main header includes a search bar with the text 'Search', a user profile 'kilian (Master Annotator)', and navigation icons. Below the header, there are tabs for languages: EN, DE, IT, NL, ZH, FR. A secondary row of tabs includes 'raw', 'tokens', 'syntax', 'semantics', '12 bits of wisdom', '0 warnings', '2 issues', and 'metadata'. The 'tokens' tab is currently selected. Underneath, there is a 'Show:' section with checkboxes for various tag layers: sem, sym, sns, roi, scp, ref, cat, drs, ptr. A note states: 'To edit gold standard tag layers, please unmark them as gold standard.' There are also buttons for '+ unfold all', '+ show all layers', and 'Mark gold:'. At the bottom, a list of items is shown, including 'Manchester-United' and 'Fulham'.

<https://pmb.let.rug.nl/explorer>

Rohdaten

EN	DE	IT	NL	ZH	FR
raw	<u>tokens</u>	syntax	semantics	1	
Manchester United defeated Fulham.					

https://pmb.let.rug.nl/explorer/explore.php?part=85&doc_id=0712&type=raw

Segmentierung

EN DE IT NL ZH FR

raw tokens syntax semantics

Mark tokenization as gold:

Manchester United defeated Fulham.

- S (start of sentence)
- T (start of token)
- I (in token)
- O (not part of token)

Eigennamen werden als ein Token behandelt, auch, wenn sie Leerzeichen enthalten.

Semantische Tags

EN DE IT NL ZH FR

raw tokens syntax semantics 12 bits of wisdom 0 warn

Show: sem sym sns rol scp ref cat drs ptr

Mark gold: sem

1 +

o DEF	Manchester~United ORG	defeated EPS	o DEF	Fulham ORG	. NIL
----------	--------------------------	-----------------	----------	---------------	----------

Semantische Tags (Abzianidze and Bos, 2017)

ANA anaphoric	PRD anaphoric & deictic pronouns: <i>he, she, I, him</i> DEF definite: <i>the, lo², der^{pl}</i> HAS possessive pronoun: <i>my, her</i> REF reflexive & reciprocal pron.: <i>herself, each_other</i> EMP emphasizing pronouns: <i>himself</i>	MOD negation: <i>not, no, neither, without</i> NEC necessity: <i>must, should, have to</i> POS possibility: <i>might, could, perhaps, alleged, can</i>	MOD modality
ACT speech act	GRE greeting & parting: <i>hi, bye</i> ITJ interjections, exclamations: <i>alas, ah</i> HES hesitation: <i>err</i> QUE interrogative: <i>who, which, ?</i>	SUB subordinate relations: <i>that, while, because</i> COO coordinate relations: <i>so, {}, {}, and</i> APP appositional relations: <i>{}, which, {}, {}</i> BUT contrast: <i>but, yet</i>	DSC discourse
ATT attribute	QUC concrete quantity: <i>two, six_million, twice</i> QVV vague quantity: <i>millions, many, enough</i> COL colour: <i>red, crimson, light_blue, chestnut_brown</i> IST interjective: <i>open, vegetarian, quickly</i> SST subjective: <i>skillful surgeon, tall ist</i> PRV privative: <i>former, fake</i> DEG degree: <i>2 meters tall, 20 years old</i> INT intensifier: <i>very, much, too, rather</i> REL relation: <i>in, on, 's, of, after</i> SCO score: <i>3-0, grade A</i>	PER person: <i>Axl_Rose, Sherlock_Holmes</i> GPE geo-political entity: <i>Paris, Japan</i> CFI geo-political origin: <i>Parisian, French</i> GEO geographical location: <i>Alps, Nile</i> ORG organization: <i>IKEA, EU</i> ART artifact: <i>iOS_7</i> HAP happening: <i>Eurovision_2017</i> UDM unit of measurement: <i>meter, \$, %, degree_Celsius</i> CTC contact information: <i>112, info@mail.com</i> URL URL: <i>http://pmb.let.rug.nl</i> LIT literal use of names: <i>his name is John</i> NTH other names: <i>table 1A, equation (1)</i>	NAM named entity
COM comparative	EGU equative: <i>Asx tall as John, whales ARE mammals</i> MOR comparative positive: <i>better, more</i> LES comparative negative: <i>less, worse</i> TOP superlative positive: <i>most, mostly</i> BOT superlative negative: <i>worst, least</i> ORD ordinal: <i>1st, 3rd, third</i>	EXS untensed simple: <i>to walk, is eaten, destruction</i> ENS present simple: <i>we walk, he walks</i> EPS past simple: <i>ate, went</i> EXG untensed progressive: <i>is running</i> EXT untensed perfect: <i>has eaten</i>	LEV events
UNE unnamed entity	CON concept: <i>dog, person</i> ROL role: <i>student, brother, prof., victim</i> GRP group: <i>John {}, Mary and Sam gathered, a group of people</i>	NOW present tense: <i>is sitting, do sit, has shied, now</i> PST past tense: <i>was baked, had gone, did go</i> FUT future tense: <i>will, shall</i> PRG progressive: <i>has been being treated, aan_het^{NL}</i> PERF perfect: <i>has been going/there</i>	TNS tense & aspect
DXS deixis	DXP place deixis: <i>here, this, above</i> DXT temporal deixis: <i>just, later, tomorrow</i> DXD discourse deixis: <i>latter, former, above</i>	DAT full date: <i>27.04.2017, 27/04/17</i> DDM day of month: <i>27th December</i> YOC year of century: <i>2017</i> DDW day of week: <i>Thursday</i> MOY month of year: <i>April</i> DEC decade: <i>80s, 1990s</i> CLD clocktime: <i>8:45_pm, 10_o'clock, noon</i>	TIM temporal entity
LOG logical	ALT alternative & repetitions: <i>another, different, again</i> EXC exclusive: <i>only, just</i> NIL empty semantics: <i>{}, to, of</i> DIS disjunction & exist. quantif.: <i>a, some, any, or</i> IMP implication: <i>if, when, unless</i> AND conjunction & univ. quantif.: <i>every, and, who, any</i>		

Symbole (1/2)

EN DE IT NL ZH FR

raw tokens syntax semantics 12 bits of wisdom 0 warn

Show: sem sym sns rol scp ref cat drs ptr

Mark gold: sym

1 + Manchester~United defeated Fulham .

manchester~united defeat fulham .

Symbole (2/2)

EN DE JA ZH

raw tokens syntax semantics 4 bits of wisdom 0 warni

Show: sem sym sns rol scp ref cat drs ptr

1 + is it convenient for you if I come at e 5~p.m. ?
be entity convenient for hearer if speaker come at o 17:00 ?

https://pmb.let.rug.nl/explorer/explore.php?part=28&doc_id=2273&type=der.xml

Synsets

EN DE IT NL ZH FR

raw tokens alignment syntax semantics 6 bits of wisdom

Show: sem sym sns rol scp ref cat drs ptr

Mark gold: sns

1 +

Ø	Manchester~United team.n.01	besiegte defeat.v.01	Ø	Fulham team.n.01	.
---	--------------------------------	-------------------------	---	---------------------	---

Semantische Rollen

EN DE IT NL ZH FR

raw tokens alignment syntax semantics 6 bits of wisdom

Show: sem sym sns rol scp ref cat drs ptr

Mark gold: rol

1 +

⊘	Manchester~United	besiegte	⊘	Fulham	.
⊘		[Co-Agent,Agent]	⊘		

Skopus

EN DE IT ZH

raw tokens syntax semantics 13 bits of wisdom 0 warn

Show: sem sym sns rol scp ref cat drs ptr

Mark gold: scp

1 + There is a library in every city in a America .

inv 0

https://pmb.let.rug.nl/explorer/explorer.php?part=00&doc_id=1428&type=der.xml

Koreferenz

EN ZH

raw tokens syntax semantics 95 bits of wisdom 0 warnings metadata

Show: sem sym sns rol scp ref cat drs ptr + unfold all + show all layers

Mark gold: ref

1 + a China's giant-pandas have been on a endangered-species lists for a nearly 30 years .

2 + There are a only about 1,600 pandas still living in the wild in a China .

3 + One of the 2008 Olympic mascots is modeled on a panda a called Jing-Jing .

4 + a Conservationists hope she will help draw a attention to the threats a facing the giant-panda -- one of a China's national symbols .

5 + a Sam-Beattie reports from a Jing-Jing's home in a Sichuan province .

https://pmb.llet.rug.nl/explorer/explore.php?part=00&doc_id=0252&type=der.xml

CCG-Kategorien

EN DE IT NL ZH FR

raw tokens syntax semantics 12 bits of wisdom 0 warning

Show: sem sym sns rol scp ref cat drs ptr

1 +

ø NP/N	Manchester~United N	defeated (S[dcj]NP)/NP	ø NP/N	Fulham N	. S[dcj]S[dcj]
-----------	------------------------	---------------------------	-----------	-------------	-------------------

CCG-Derivationen

EN DE IT NL ZH FR

raw tokens syntax semantics 12 bits of wisdom 0 warning

Show: sem sym sns rol scp ref cat drs ptr

1

o NP/N	Manchester~United N	defeated S[dcj]\NP)/NP	o NP/N	Fulham N	. S[dcj]\S[dcj]
-----------	------------------------	---------------------------	-----------	-------------	--------------------

Manchester~United NP Fulham NP

defeated Fulham
S[dcj]\NP

Manchester~United defeated Fulham
S[dcj]

Manchester~United defeated Fulham .
S[dcj]

CCG-Derivationen mit Semantik

EN DE IT NL ZH FR

raw tokens syntax semantics 12 bits of wisdom 0 warnings metadata

Show: sem sym sns rol scp rel cat dts ptr - fold all + show all layers

1) @ Manchester-United
 NP/N
 Av1.Az2: ((x1 : (v1 @ x1)) - (v2 @ x1))
 Name(x1)
 Name(v1, manchester-united)

Manchester-United
 NP
 Av1: (x1) - (v1 @ x1)
 Name(x1)
 Name(v1, manchester-united)

defeated
 (T)S(N)NP/NP
 Av1.Az2.Az3: (v2 @ Av4: (v1 @ Av5: (x1 : t1 : (v2 @ e1)) : (v3 @ e1)))
 defeated(t1)
 Time(t1, t1)
 Co-Agent(e1, v2)
 Agent(e1, v4)
 Time(t1)
 It < now

Fulham
 NP/N
 Av1.Az2: ((x1 : (v1 @ e1)) - (v2 @ x1))
 Name(x1)
 Name(v1, fulham)

Fulham
 NP
 Av1: (x1) - (v1 @ x1)
 Name(x1)
 Name(v1, fulham)

Manchester-United defeated Fulham
 S(N)NP
 Av1.Az2: (v1 @ Av3: (x1 : e1 : t1 : (v2 @ e1)))
 defeated(t1)
 Time(t1, t1)
 Co-Agent(e1, x1)
 Agent(e1, v2)
 Time(t1)
 It < now
 Name(x1)
 Name(v1, fulham)

Manchester-United defeated Fulham
 S(N)S
 Av1: (x1 : (v2 @ e1 : t1)) - (v1 @ e1)
 Name(x1)
 Name(v1, manchester-united)
 defeated(t1)
 Time(t1, t1)
 Co-Agent(e1, v2)
 Agent(e1, x1)
 Time(t1)
 It < now
 Name(v2, fulham)
 Name(v2, fulham)

Manchester-United defeated Fulham
 S(N)S
 Av1: (x1 : (v2 @ e1 : t1)) - (v1 @ e1)
 Name(x1)
 Name(v1, manchester-united)
 defeated(t1)
 Time(t1, t1)
 Co-Agent(e1, v2)
 Agent(e1, v1)
 Time(t1)
 It < now
 Name(v2, fulham)
 Name(v2, fulham)

Alles

EN DE IT NL ZH FR

raw tokens syntax semantics 12 bits of wisdom 0 warnings metadata

Show: sem sym sne rsl scp ref cat dms ptr - fold all + show all layers

Manchester-United

ORG
manchester-united
team.n.01
N
Ar1

team.n.01(x1)
Name(x1, manchester-united)

NP
Ar1, (x1) : (v1 @ x1)

team.n.01(x1)
Name(x1, manchester-united)

defeated

VP
defeat
defeat.v.01
[Co-Agent, Agent]
S[passive, NP]
Ar1 Ar2 Ar3, Ar4 @ Ar5, (x1 x1) : (v3 @ x1) {}

defeat.v.01(x1)
Time(x1, t1)
Co-Agent(x1, v5)
Agent(x1, v6)
Time.n.0001() : t1 < now

Fulham

ORG
fulham
team.n.01
N
Ar1

team.n.01(x1)
Name(x1, fulham)

NP
Ar1, (x1) : (v1 @ x1)

team.n.01(x1)
Name(x1, fulham)

Fulham

ORG
fulham
team.n.01
N
Ar1

team.n.01(x1)
Name(x1, fulham)

NP
Ar1, (x1) : (v1 @ x1)

team.n.01(x1)
Name(x1, fulham)

Manchester-United defeated Fulham

S[passive]
Ar1, (x1 x2, x1 t1) : (v1 @ x1)

team.n.01(x1)
Name(x1, manchester-united)
defeat.v.01(x1)
Time(x1, t1)
Co-Agent(x1, x2)
Agent(x1, x1)
Time.n.0001() : t1 < now
team.n.01(x2)
Name(x2, fulham)

Manchester-United defeated Fulham

S[passive]
Ar1, (x1 x2, x1 t1) : (v1 @ x1)

team.n.01(x1)
Name(x1, manchester-united)
defeat.v.01(x1)
Time(x1, t1)
Co-Agent(x1, x2)
Agent(x1, x1)
Time.n.0001() : t1 < now
team.n.01(x2)
Name(x2, fulham)

Discourse Representation Graph

EN DE IT NL ZH FR

raw tokens syntax semantics 12 bits of wisdom 0 warnings metadata

Discourse Representation Graph (sequence notation)

```
team.n.01 Name "Manchester United" % Manchester United [0-17]
defeat.v.01 Agent -1 Time +1 Co-Agent +2 % defeated [18-26]
time.n.08 TPR now % [27-34]
team.n.01 Name "Fulham" % Fulham. [27-34]
```

Discourse Representation Graph (graph notation)

The graph notation shows a central node 'defeat.v.01' connected to three other nodes: 'team.n.01' (Manchester United), 'time.n.08' (now), and 'team.n.01' (Fulham). The relationships are labeled 'Agent', 'Time', and 'Co-Agent' respectively. Each 'team.n.01' node is connected to its corresponding name ('Manchester United' and 'Fulham') via a 'Name' relationship. A root node (represented by a box) is connected to 'defeat.v.01' and both 'team.n.01' nodes via epsilon (ε) relationships.

Discourse Representation Structure (Box Notation)

Discourse Representation Structure (box notation)

Show: pointers senses FrameNet

x1	x2	e1	t1
team(x1)			
		Name(x1, manchester-united)	
time(t1)			
		t1 < now	
defeat(e1)			
		Time(e1, t1)	
		Co-Agent(e1, x2)	
		Agent(e1, x1)	
team(x2)			
		Name(x2, fulham)	

Discourse Representation Structure (Clause Notation)

Discourse Representation Structure (clause notation)

```
b1 REF x1                                % Manchester-United [0...17]
b1 Name x1 "manchester-united"          % Manchester-United [0...17]
b1 PRESUPPOSITION b3                    % Manchester-United [0...17]
b1 team "n.01" x1                        % Manchester-United [0...17]
b3 REF e1                                % defeated [18...26]
b3 REF t1                                % defeated [18...26]
b3 Agent e1 x1                           % defeated [18...26]
b3 Co-Agent e1 x2                        % defeated [18...26]
b3 TPR t1 "now"                          % defeated [18...26]
b3 Time e1 t1                             % defeated [18...26]
b3 defeat "v.01" e1                      % defeated [18...26]
b3 time "n.08" t1                        % defeated [18...26]
b2 REF x2                                % Fulham [27...33]
b2 Name x2 "fulham"                      % Fulham [27...33]
b2 PRESUPPOSITION b3                    % Fulham [27...33]
b2 team "n.01" x2                        % Fulham [27...33]
                                          % . [33...34]
```

DRS eines Dokuments mit mehreren Sätzen

<p>b3: x1 x2 e1 x3 x4 t1 x5 x6 x7 x8</p> <p>country(x1) Name(x1, china) giant_panda(x2) Source(x2, x1) time(t1) t1 < now beta(t1) Duration(e1, x5) Time(e1, t1) Location(e1, x3) Theme(e1, x2) endangered_species(x4) list(x3) PartOf(x4, x1) quantity(x5) x6 < x7 quantity(x7) x7 = 30 measure(x5) Unit(x5, x8) Quantity(x5, x8) year(x8)</p>	<p>b4: e2 x9 x10 x11 x12 x1 t2</p> <p>time(t2) t2 = now beta(t2) Time(e2, t2) Location(e2, x1) Manner(e2, x12) Theme(e2, x9) quantity(x10) x10 = x11 panda(e3) Quantity(x9, x10) quantity(x11) x11 = 1900 wild(x12) quantity(x1) Name(x1, china)</p>	<p>b6: x13 e3 x14 x15 e4 t3 x16</p> <p>entity(x13) PartOf(x13, x16) Quantity(x13, t1) time(t3) YearOfCentury(t3, 2008) Name(t3, olympic-games) t3 = now tournament(t3) mascot(x16) model(e3) Time(e3, t3) Destination(e3, x14) Theme(e3, x13) panda(e4) call(e4) Result(e4, x15) Theme(e4, x14) name(x15) x15 = jing-jing</p>	<p>b7: x17 x18 e5 t4</p> <p>conservationist(x18) person(x17) Role(x17, x18) time(t4) t4 = now hope(t5) Time(e5, t4) Agent(e5, x17) Proposition(e5, b6)</p>	<p>b8: x14 e6 x19 e7 x20 x21 e8 x22 x1 x23 x1 t5</p> <p>female(x14) time(t5) t5 > now help(e6) Time(e6, t5) Beneficiary(e6, e7) Agent(e6, x14) draw(e7) Destination(e7, x20) Theme(e7, x19) Agent(e7, x14) attention(x19) threat(x20) x20 = x22 face(e8) Theme(e8, x21) Agent(e8, x20) giant_panda(e21) entity(x20) PartOf(x22, x23) Quantity(x22, t1) country(x1) Name(x1, china) symbol(x23) Source(x23, x1) national(e51) AttributeOf(x1, x23)</p>	<p>b12: x24 e9 x25 x26 x27 t4</p> <p>female(x24) Name(x24, sam-beatie) report(e9) Time(e9, t4) Location(e9, x26) Theme(e9, x24) time(t4) t4 = now animal(x25) Name(x25, jing-jing) home(x26) User(x26, x25) Location(x26, x27) province(x27) Name(x27, sichuan)</p>
<p>CONTINUATION(b3, b4) CONTINUATION(b4, b6) CONTINUATION(b6, b7) ATTBUSINESS(b7, b8) CONTINUATION(b6, b12)</p>					

Parallele Daten

EN DE IT NL ZH FR

raw **tokens** syntax semantics 6 bits of wisdom 0 warnings metadata

Show: sem sym sns rol scp rel cat drs ptr -fold all + show all layers

1 | # DEP # O #PN #1 #2 ((x1 @ x1) - #2 @ x1)

Manchester-United
 CRD
 Manchester-United
 Name: n:01
 Name: n:01(x1)
 Name: x1, manchester-united

belegte
 CRD
 belegte
 Name: n:01
 Co-Agent: Agent1
 S:nc: n:01, NP
 #1 #2 #3 #4 #5 #6 ((x1 @ x1) - #2 @ x1)

Fulham
 CRD
 Fulham
 Name: n:01
 Name: n:01(x1)
 Name: x1, fulham

Manchester-United
 NP
 #1 ((x1 @ x1) - #1 @ x1)
 Name: n:01(x1)
 Name: x1, manchester-united

Fulham
 NP
 #1 ((x1 @ x1) - #1 @ x1)
 Name: n:01(x1)
 Name: x1, fulham

belegte Fulham
 S:nc: NP
 #1 #2 ((x1 @ x1) - #2 @ x1)
 Name: n:01(x1)
 Co-Agent: Agent1, x1
 S:nc: n:01(x1)
 #1 < now
 Name: n:01(x1)
 Name: x1, fulham

Manchester-United belegte Fulham
 S:nc: NP
 #1 ((x1 @ x1) - #1 @ x1)
 Name: n:01(x1)
 Name: x1, manchester-united
 #2 ((x1 @ x1) - #2 @ x1)
 Name: n:01(x1)
 Co-Agent: Agent1, x2
 Agent1: x1
 S:nc: n:01(x1)
 #1 < now
 Name: n:01(x1)
 Name: x1, fulham

Manchester-United belegte Fulham -
 S:nc: NP
 #1 ((x1 @ x1) - #1 @ x1)
 Name: n:01(x1)
 Name: x1, manchester-united
 #2 ((x1 @ x1) - #2 @ x1)
 Name: n:01(x1)
 Co-Agent: Agent1, x2
 Agent1: x1
 S:nc: n:01(x1)
 #1 < now
 Name: n:01(x1)
 Name: x1, fulham

every als temporaler VP-Modifizierer (1/2)



https://pmb.let.rug.nl/explorer/explore.php?part=00&doc_id=1428&type=der.xml

Zu beachten

- ▶ Universelle Determinierer werden AND getaggt und existenzielle DIS
- ▶ Nicht nur das semantische Tag bestimmt die λ -DRS eines Funktionsworts, sondern auch seine CCG-Kategorie (und Symbole, Synsets, Skopus- und Koreferenztags...)
- ▶ Universelle Implikation wird als doppelte Negation ausgedrückt
- ▶ Intersektive Relativpronomen werden AND getaggt (Information aus dem Relativsatz wird einfach mit der Information aus dem Bezugsnomen gemerget)

Zusammenfassung

Kategorialgrammatiken sind superspannend!

Literatur I

- Abzianidze, L. and Bos, J. (2017). Towards universal semantic tagging. In *IWCS 2017 — 12th International Conference on Computational Semantics — Short papers*.
- Bos, J. (2015). Open-domain semantic parsing with boxer. In *Proceedings of the 20th Nordic Conference of Computational Linguistics (NODALIDA 2015)*, pages 301–304, Vilnius, Lithuania. Linköping University Electronic Press, Sweden.
- Lewis, M. and Steedman, M. (2014). A* CCG parsing with a supertag-factored model. In *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, pages 990–1000, Doha, Qatar. Association for Computational Linguistics.