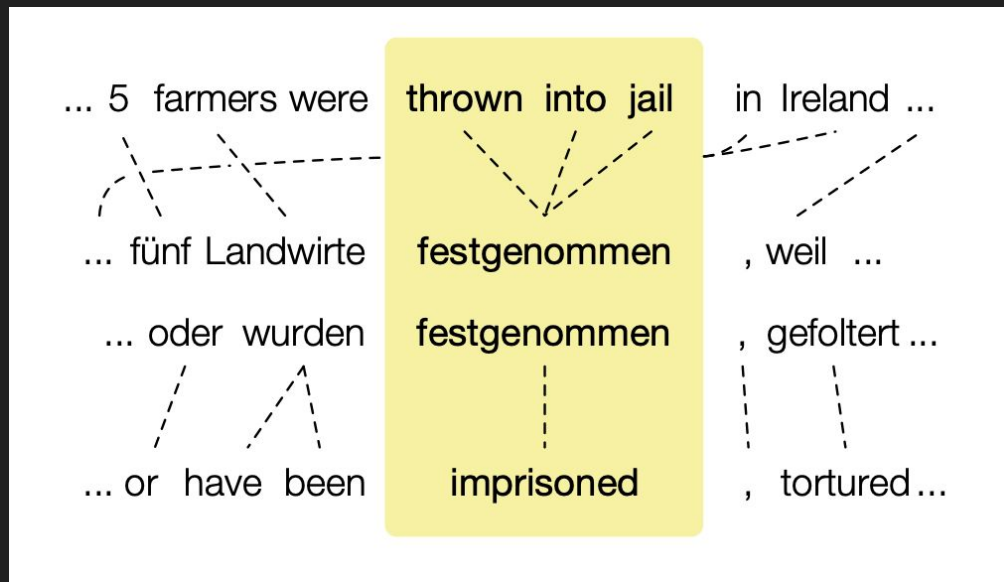


Paraphrasing

Edward Jiang, Yash Sinha, Christian Gould

PPDB: The Paraphrase Database

- Database containing:
 - Paraphrase patterns
 - Lexical Paraphrases
 - Paraphrase pairs
 - Stored as n-grams
- Created using bilingual pivoting, i.e. language translation, like playing Telephone



AESOP: Paraphrase Generation with Adaptive Syntactic Control

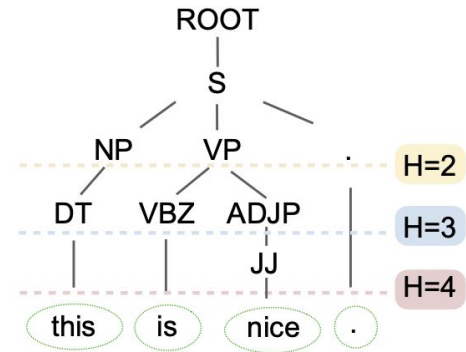
Syntactically-controlled paraphrase generation

Adaptive Syntactically Controlled Paraphrasing (AESOP)

Language model

Adaptive selection module

Constituency Parse trees



H=2	(ROOT (S (NP) (VP) (.)))
H=3	(ROOT (S (NP (DT)) (VP (VBZ) (ADJP)) (.)))
H=4	(ROOT (S (NP (DT)) (VP (VBZ) (ADJP (JJ))) (.)))

Introduction to our Paraphrasing Design

Why is paraphrasing important?

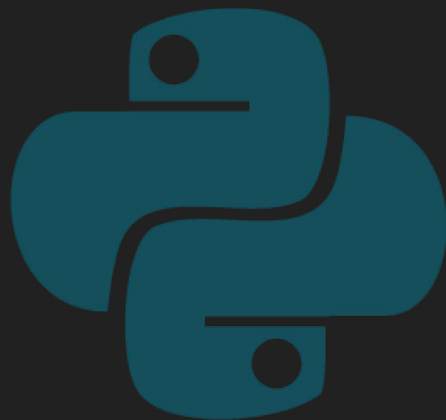
Passive / Active Voice

Rule-based vs model-based

Our Program's Implementation

- Identify active and passive sentences
- Convert them
- NLTK
 - a. Natural language toolkit
- spaCy
 - a. Machine learning library for NLP operation

spaCy



NLTK

Program's execution

spaCy dependency parser

Formulate results to NLTK tree

Determine voice by part of speech (auxpass)

The	det =>	test	determiner
test	nsubjpass =>	taken	nominal subject (passive)
was	<u>auxpass</u> =>	taken	auxiliary (passive)
taken	ROOT =>	taken	None
by	agent =>	taken	agent
Christian	pobj =>	by	f preposition

Passive Sentence

taken

test

by

was

The

Christian

Phrases

If Active

- Absence of auxpass

[subject] + [verb] + [indirect object] + [direct object]

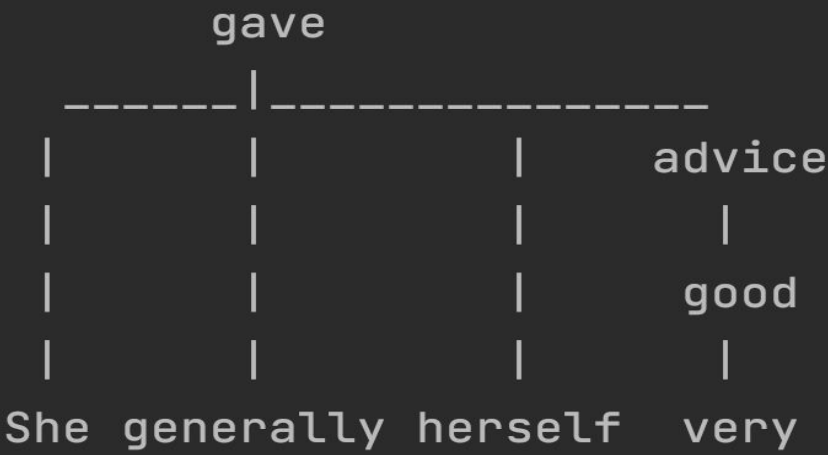
[subject] + [verb] + [direct object] + [object of preposition]

She generally gave herself very good advice.

[direct object] + [be] + [verb] + [to] + [indirect object/object of preposition] +
[by] + [subject].

Active Example Input: She generally gave herself very good advice

She	nsubj =>	gave	nominal subject
generally	advmod =>	gave	adverbial modifier
gave	ROOT =>	gave	None
herself	dative =>	gave	dative
very	advmod =>	good	adverbial modifier
good	amod =>	advice	adjectival modifier
advice	dobj =>	gave	direct object

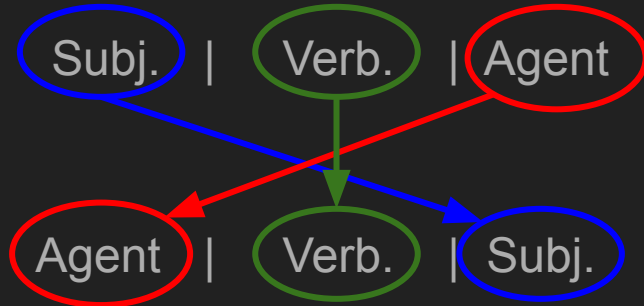


Very good advice is gave to herself by her generally

If Passive

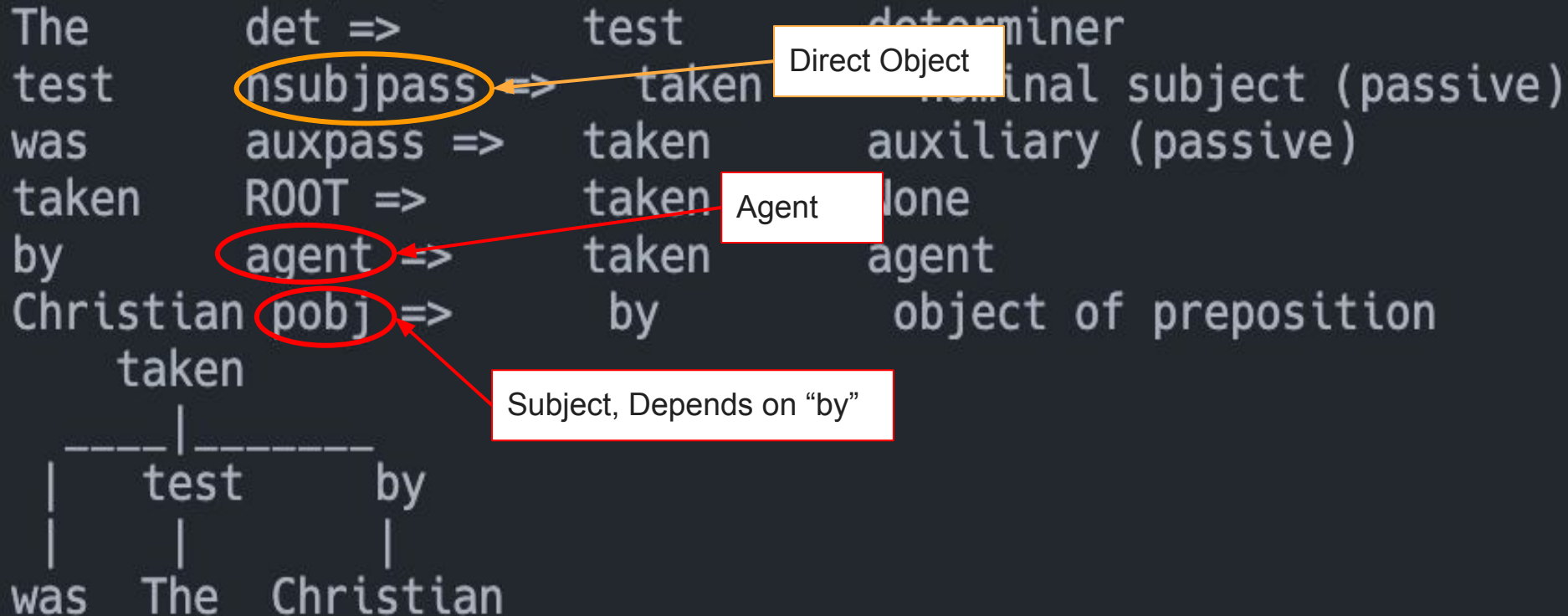
- Presence of “auxpass”
- Find Subject and Agent
- Make Agent The Subject, and Subject the Direct Object.
- Attempt to convert the verb (was taken -> takes)

Ex.) The test | was taken | by Christian



“Christian was taken The test” → “Christian takes the test”

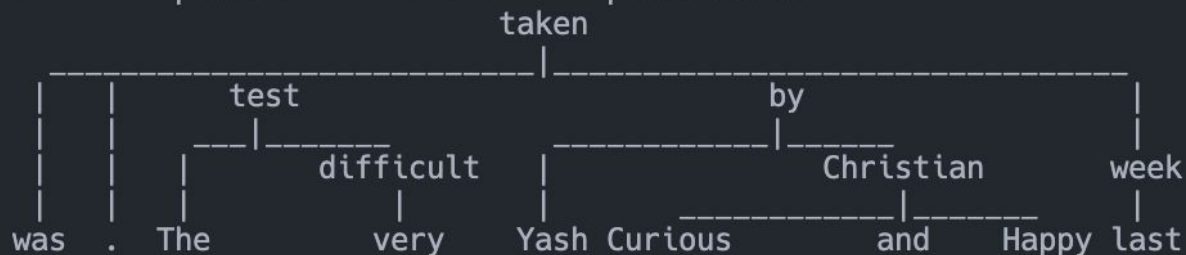
Passive Example



Limitations

- Verbs conjugations
- Spacy dependency parser
 - Incorrect POS recognition
- Complex sentences

The	det =>	test	determiner
very	advmod =>	difficult	adverbial modifier
difficult	amod =>	test	adjectival modifier
test	nsubjpass =>	taken	nominal subject (passive)
was	auxpass =>	taken	auxiliary (passive)
taken	ROOT =>	taken	None
by	agent =>	taken	agent
Curious	amod =>	Christian	adjectival modifier
Christian	pobj =>	by	object of preposition
and	cc =>	Christian	coordinating conjunction
Happy	conj =>	Christian	conjunct
Yash	pobj =>	by	object of preposition
last	amod =>	week	adjectival modifier
week	npadvmod =>	taken	noun phrase as adverbial modifier
.	punct =>	taken	punctuation



this is a passive sentence
Yash very takes the test

Conclusion & Future work

- Simple program for paraphrasing
 - Converting between voices
 - Many limitations
- Neural network
 - Deal with complex grammar rules

Q&A

