

From Receptive to Productive: Learning to Use Confusing Words through Automatically Selected Example Sentences

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Introduction

- Sentence Selection Task
 - Recommend 5 example sentences for each word to explain the difference between confusing words.
- Using bilingual information to improve meaning.

Usual

Chambers Bay was busier than usual for a Monday at the U.S.

The team will have its usual Friday-Saturday schedule in advanced of the game.

Yet they say it's business as usual this week.

Classes will resume as usual Monday, Gregory said.

Others continue business as usual after top leadership hits.

He seemed like an ordinary person who wasn't hiding anything.

He appeared to be an ordinary citizen, a post-office employee.

She's rich; she's out of touch with ordinary Americans.

It's just never easy for us ordinary people to make money.

I'm an ordinary Chinese, not a party member.

Sample example sentences recommended by our system

Automatic Example Sentence Selection

- Clarification Score = Fitness Score * Relative Closeness Score
$$Score(s|w_i) = P(s|w_i) * \left(\sum_{w_j \in W - w_i} P(s|w_i) - P(s|w_j) \right)$$
- Word Usage Model – estimating $P(s|w_i)$
 - GMM with Local Contextual Features
 - BiLSTM
- Dictionary-like Sentence Classification
 - Both extremely long and short sentences are bad.

Word	Example Sentence
refuse	I was expecting you to refuse to leave the house.
refuse	She declined to serve as an informant and refused <u>his request</u> that she keep their meeting secret.
reject	In July, a judge in Australia rejected <u>his request</u> for a suppression order.

Example sentences that illustrate clarification

Leveraging First Language for Better Example Sentence Selection

- Words are confusing due to language transfer from L1 (native language) to L2 (foreign language).
- Translation - Translate example sentences into L1 language.
- Alignment - Find out the L1 translation of the target word.
- Grouping - Keep sentences with the similar L1 translation.
- Sentence Selection.

Word	L1 Definitions
Hard	Not Easy Requiring great physical or mental effort to accomplish Resisting weight or pressure Hard to bear
Difficult	Not Easy Requiring great physical or mental effort to accomplish Hard to control

Deployment – Sentence Translation

- Sentence Translation
- Grading Criteria
 - Appropriateness
 - Local Grammar
 - Global Grammar
 - Structure
 - Meaning



Example	Grade
① There is a small opportunity possibility that she had met a person.	0/1
② What are you going to do if we <u>refuse</u> to following follow you?	3/4
③ This building is was <u>destroyed</u> by the earthquake.	3/4
④ This accident was caused by error . (by human error)	1/2
⑤ To a <u>skillful</u> pilot, it's lucky to say that landing in torrential rain . (Landing safely in torrential rain can only be a matter of luck for the most skilled pilot.)	1/2

- Result

	①		②		①*5 + ②		③		④		⑤	
	pre	post	pre	post	pre	post	pre	post	pre	post	pre	post
V	0.71	0.57	3.43	3.14	7.00	6.00	2.43	2.14	0.71	1.00	1.00	1.00
G	0.44	0.44	2.44	3.00	4.67	5.22	1.67	1.56	0.67	1.22*	0.33	1.11*
B	0.27	0.55*	2.37	3.27*	3.73	6.00*	1.55	1.36	0.82	1.18	0.55	0.91

High Proficient Group

	①		②		①*5 + ②		③		④		⑤	
	pre	post	pre	post	pre	post	pre	post	pre	post	pre	post
V	0.18	0.36	2.18	2.91	3.09	4.73	0.82	1.09	0.36	1.00*	0.46	0.64
G	0.42	0.58	2.33	2.92	4.42	5.83	0.75	1.50*	0.50	1.17*	0.33	1.08*
B	0.43	0.52	2.67	2.71	4.81	5.33	1.24	1.57	0.76	1.14*	0.52	0.86*

Less Proficient Group

Human Evaluation and Analysis

- Questionnaire
 - Q1 - Is Mandarin your first language (y/n)?
 - Q2 - Are these words confusing to you (y/n)?
 - Q3 - Which set of example sentences you think is more useful for learning these words (1/2)?
 - Q4 - In what aspect you think they are more useful ?
(a) clarifying their meaning (b) demonstrate their usage (c) showing correct grammar

Q1	Q2	Q3 (turker)		Q3 (expert)		Q4	
-	-	BiLSTM	GMM	BiLSTM	GMM	BiLSTM	GMM
19.7%	5%/95%	42%	67%	50%	58%	32%/56%/12%	24%/56%/20%

- Word Sense Disambiguation (WSD).
[hard, difficult, tough] → “~~work hard~~”
- Focus on the demonstration of the confusing sense.
[defeat, win, beat] → to conquest, victory → win (v. / n.)
- Workers prefer example sentences of some pattern.
[scare, rare, unusual] → very hardly (adv., adj., adj.)