Response Generation for Grounding in Communication at NTCIR-13 STC Japanese Subtask

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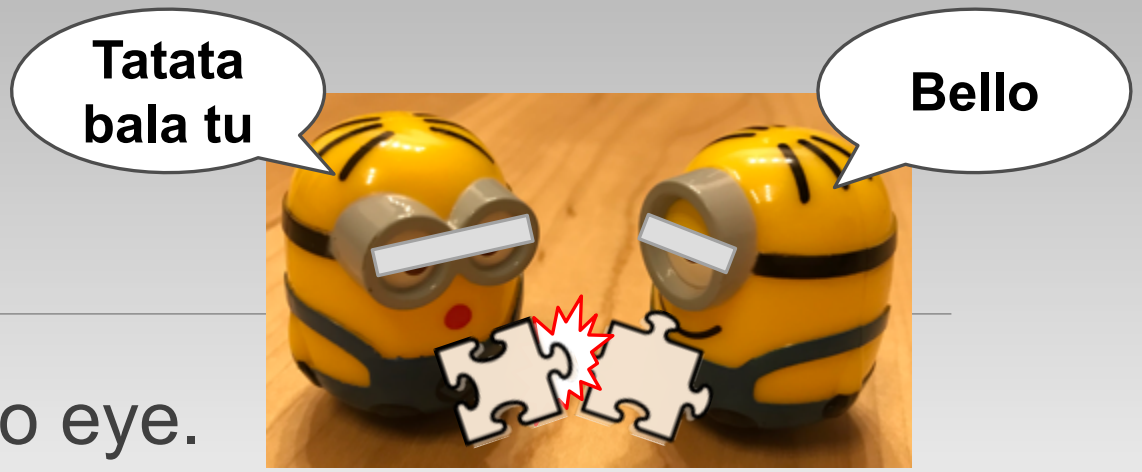
Background



Assuming that we cannot see eye to eye.
We still cannot even understand Minions conversation now.
So we have a question why our communication is broken.

The reasons are …

1. Comment text has ambiguity of **vocabulary**.
2. Comment text has ambiguity of **domain knowledge**.
3. Intent types of the comment text are **untrusted**.
4. Lack of **knowledge** in the responder.

⬇

Grounding in Communication

Objective

What is the purpose of STC task?

The perspectives are …

1. **Fluent**: The response is fluent and understandable from a grammatical point of view.
2. **Coherent**: The response keeps coherence with the topic of the news and the comment.
3. **Context-dependent**: The response depends on and is related to the comment.
4. **Informative**: The response is informative and influences the author of the comment.

Methodology

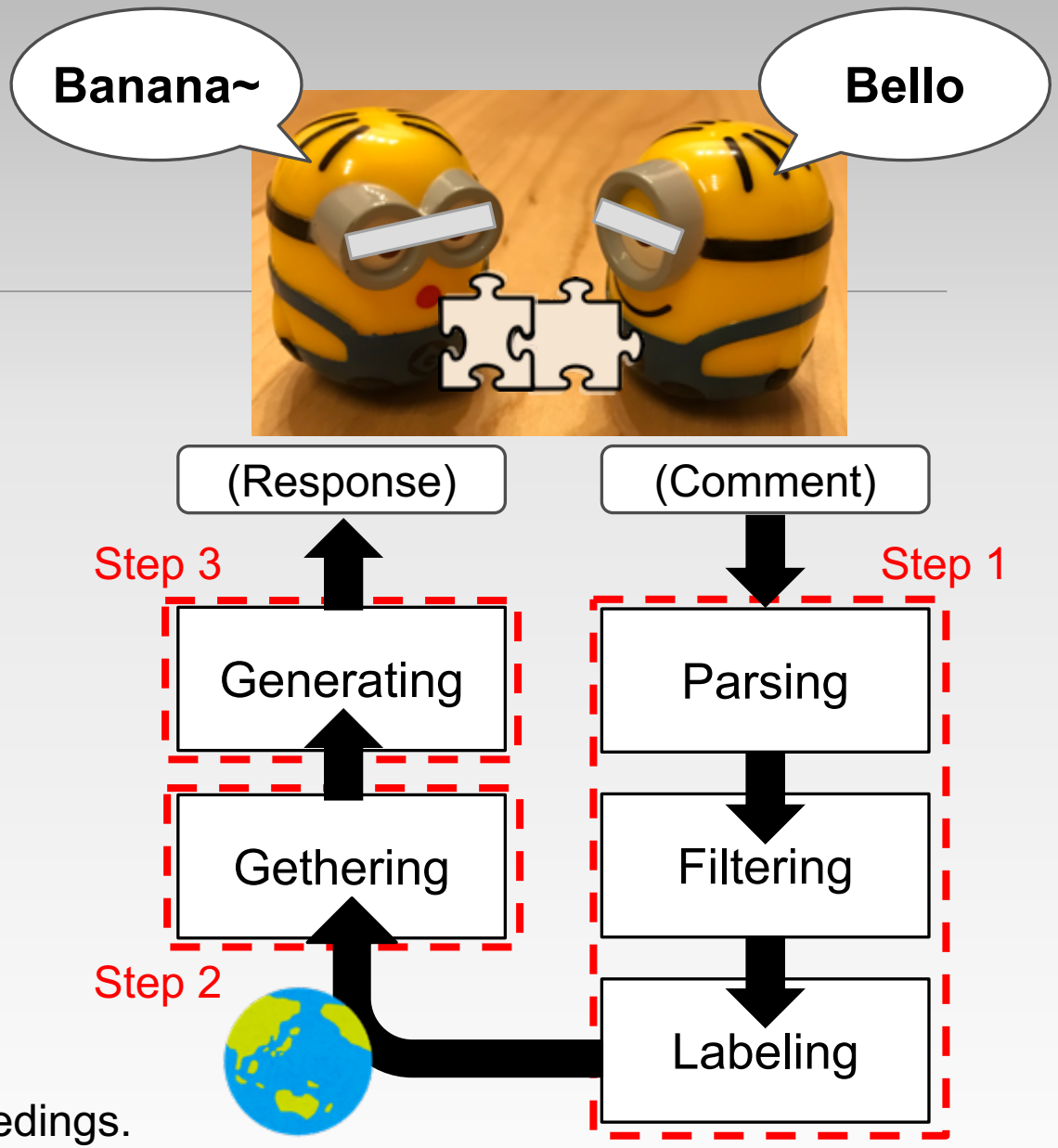
How to ground in communication?

The method of auto-responder consists of three steps.

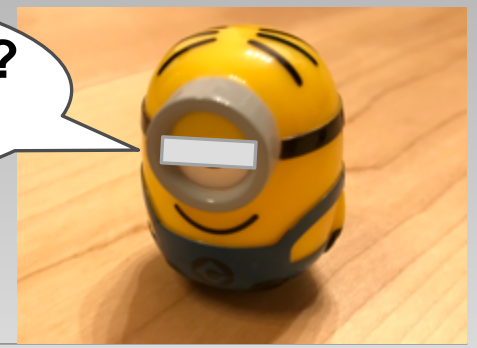
Step 1. **Labeling** six intent types to a comment text.

Step 2. **Gathering*** associated information.

Step 3. **Generating** responses based on rules.



* Gathering is represented as Finding in our proceedings.



Responder System (1/5)

Segmenting comments and extracted sentences with POS Tagger, and filtering those terms by POS types.

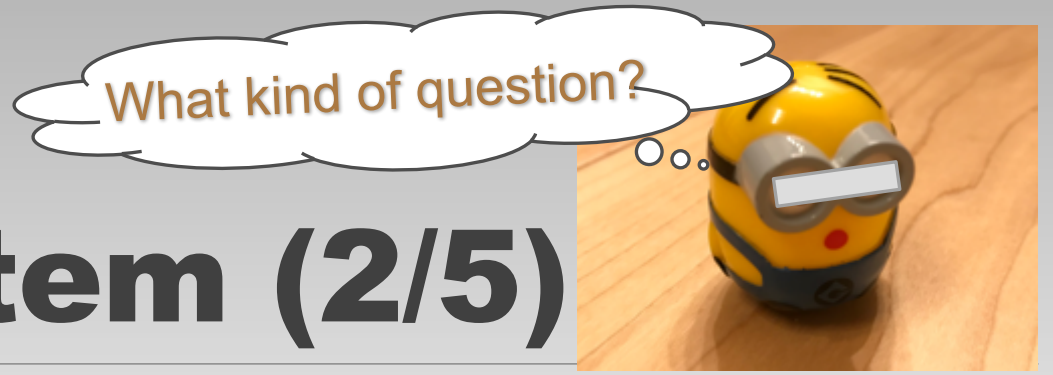
柴崎/って/誰/？/ 知り/ませ/ん/が/… / 。
(Who is Shibasaki? I don’t know.) <segmented>

↓

柴崎/って/誰/？/ 知り/ませ/ん/が/… /。
(Who is Shibasaki? I don’t know.) <filtered>

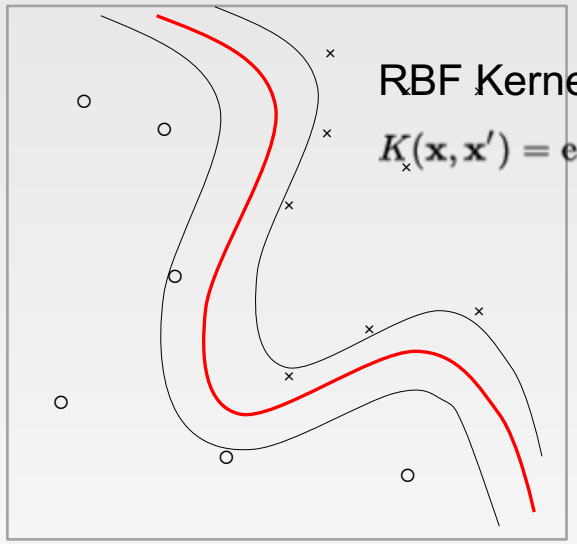
Table 1: POS list for filtering.

Type	Subtype
Noun, Adjective-base	General, Verbal, Proper, Adverbial, Number, Suffix
Verb	Independent
Adjective	Independent
Adverb	General
Auxiliary	Aux special-nai
Prefix	Normal
Adjective	Auxiliary
Filler	*
Interjection	*



Responder System (2/5)

Labeling with SVM.



RBF Kernel

$$K(\mathbf{x}, \mathbf{x}') = \exp\left(-\frac{\|\mathbf{x} - \mathbf{x}'\|^2}{2\sigma^2}\right)$$

$$\text{minimize } \frac{1}{n}\sum_{i=1}^{n}\zeta_i + \lambda\|w\|^2$$

$$\text{subject to } y_i(w \cdot x_i - b) \geq 1 - \zeta_i \text{ and } \zeta_i \geq 0, \text{ for all } i.$$

Table 2: Five labels learned by SVM.

Labels
positive / negative
who
opinion
impression

Sports, Shibasaki Gaku, Kashima Antlers, Foot ball, player, transferred, left, Shoma Doi, Gaku Shibasaki, excites, audience, Spanish, Who, Shibasaki, don't, know

label = {positive, who}

Responder System (3/5)

Finding more information via internet. (e.g. Google)

Query:

Sports, Shibasaki Gaku, Kashima Antlers, Foot ball, player, transferred, left, Shoma Doi, Gaku Shibasaki, excites, audience, Spanish, Who, Shibasaki, don’t, know

Extracted sentences*:

Shibasaki is from Aomori.
Kashima Antlers
Spain
Japanese football player
A midfielder for Spanish club Getafe CF
La Liga

* Sentences are contained among top three results.

Responder System (4/5)

Table 3: Strategies and rules.

Strategy	Rule	Keyword
A: Explicit confirm	[1] Yes/No question	parroting
B: Implicit confirm	[2] Repeating affirmative sentence	alternative keywords
	[3] Repeating affirmative sentence (Parroting)	parroting
C: Continuation	[4] Responding a question	alternative keywords
	[5] Responding a question with extracted keywords	extracted and alternative keywords

Generating responses with grounding strategy.

Q. What name is a Chinese restaurant in Iidabashi?

A: [1] Did you say Iidabashi?
B: [2] There are 96 Chinese restaurants in Iidabashi.
[3] Your question is what name is the Chinese restaurant in Iidabashi, right?
C: [4] Do you know Zenrakubou?
[5] How about Roran's dumpling?

Responder System (5/5)

Generating responses with candidate words and five response rules.

w1 = {Shibasaki}
w2 = {know}
w3 = {don't}

a1 = {from Aomori}
a2 = {Kashima Antlers}
a3 = {a foot ball player}

<randomly chosen>

- Why rule-based?
  Because, we tried the generating sentence with LSTM. However, the sentence is not enough fluent.

Table 4: Five templates.

Strat	Rule	Template
A:	[1]	[R_1] "Don't you"+w2+"who"+w1+"is?" **Don't you know who Shibasaki is?**
B:	[2]	[R_2] w1+"is"+a1+", you know." **Shibasaki is from Aomori, you know.**
	[3]	[R_3] "You"+w3+w2+w1+"is , right?" **You don't know who Shibasaki is, right?**
C:	[4]	[R_4] "Do you know"+a2+"?" **Do you know Kashima Antlers?**
	[5]	[R_5] w1+"is"+a3+", right?" **Shibasaki is a foot ball player, right?**

<randomly chosen among matched templates by labels>

Other Responses

スポーツ
ニューイングランド・ペイトリオッツ|アメリカ合衆国|アリゾナ・カーディナルス|スーパーボウル
NFL優勝選手が大統領表敬
拒否失うものがあったとしても、自分の根っ子の部分は曲げない。 大事な事だと感じる。

曲げを感じたの？
プレディらは欠席したね。
曲げたように感じたね。
表敬訪問を拒否しましたか？
なぜプレディは拒否したと思いますか？

コンピュータ
人工知能（AI）|NEC|機械学習|ディープラーニング
NEC AIを活用した創薬に参入
こういう記事に否定的な意見を言う人にはうんざり。是非とも頑張ってもらいたい。

記事を否定する人がいるの？
NECがサイバー攻撃分析にAI導入だって？
否定意見を言う人も是非頑張ってほしいね。
NECは頑張ってますか？
なぜNECはAIを活用すると思いますか？

経済
ティファニー不振 CEOが退任
好きなブランドの一つだけど、最近、気品が感じられない。

気品を感じないの？
業績不振を理由に辞任したね。
気品を感じないね。
トランプ・タワーに本店が隣接してるの？
なぜティファニーは業績不振と思いますか？

エンターテインメント
SMAP|大野智|ジャニーズ|活動休止・解散（芸能界）|嵐（グループ）
嵐・大野「SMAPは偉大すぎ」
本当にそう思うなら、もっと早い段階に、自分の言葉でSMAPに対する思いを語ってほしかった。
それは、他のジャニーズメンバーに対しても同じ。

SMAPはジャニーズメンバーですか？
大野智が解散するSMAPに言及したね。
自分の言葉で語ってほしかったね。
もっと早い段階ですか？
SMAPは偉大ですか？

Experiments

Generating responses with five response rules are pretty good at Rule-1.

Table 4: Top five of Mean $Acc_{L1,L2}$@1 in Rule-1 including AITOK-J-R1.

Run ID	Mean nG@1	Mean nERR @2	Mean Acc_{L2} @1	Mean Acc_{L2} @2	Mean $Acc_{L1,L2}$ @1	Mean $Acc_{L1,L2}$ @2
AITOK-J-R1	0.4468	0.4838	0.0280	0.0660	**0.9840**	**0.9710**
GOLD-J-R1	**0.7753**	**0.7757**	**0.4720**	**0.4430**	0.8980	0.8840
KIT16-J-R1	0.5014	0.5580	0.1800	0.1690	0.8240	0.7980
KIT16-J-R4	0.4804	0.5372	0.1660	0.1610	0.8000	0.7700
YJTI-J-R2	0.4893	0.5468	0.2040	0.2030	0.7620	0.7310

Table 5: Top five of Mean $Acc_{L1,L2}$@1 in Rule-2 and AITOK-J-R1.

Run ID	Mean nG@1	Mean nERR @2	Mean Acc_{L2} @1	Mean Acc_{L2} @2	Mean $Acc_{L1,L2}$ @1	Mean $Acc_{L1,L2}$ @2
GOLD-J-R1	**0.7646**	**0.7639**	**0.4720**	**0.4430**	**0.8660**	**0.8430**
YJTI-J-R2	0.4726	0.5288	0.2040	0.2030	0.7200	0.6900
KIT16-J-R1	0.4173	0.4676	0.1800	0.1690	0.6320	0.6050
KIT16-J-R4	0.4014	0.4549	0.1660	0.1610	0.6200	0.5900
YJTI-J-R1	0.4171	0.4544	0.1860	0.1490	0.6100	0.5750
AITOK-J-R1	0.0816	0.1758	0.0280	0.0660	0.1400	0.3100

What happened?

However, those responses are extremely bad at Rule-2.

Experiments

What's difference between RULE-1 and RULE-2?


```
RULE-1:
IF fluent & coherent = L1
  IF context-dependent & informative = L2
    THEN L2
  ELSE L1
ELSE
  L0
```

If the response is not related to the comment and the response is not informative to continue and extent the dialogue, **the response is evaluated by fluent and coherent**.

```
RULE-2:
IF fluent & coherent = L1
  IF context-dependent & informative = L2
    THEN L2
  ELSE IF context-dependent or informative = L0
    THEN L0
  ELSE L1
ELSE
  L0
```

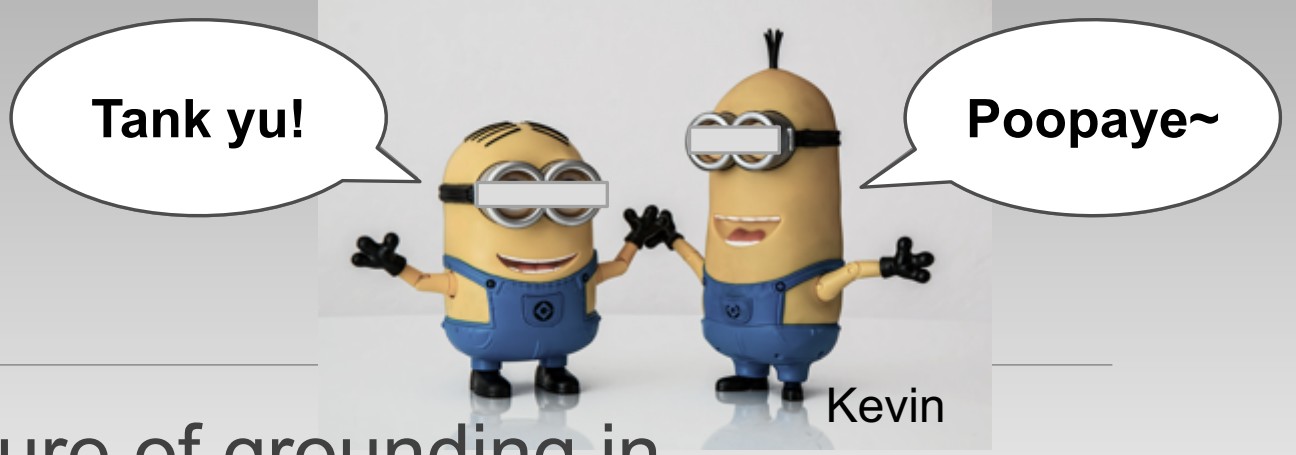
If the response is not related to the comment and the response is not informative to continue and extent the dialogue, **the response is evaluated by fluent and coherent except in case of not related to the comment or not informative at all.**

Discussion

- Communication grounding strategies are very effective.
- The grounding rule is based on ungrounded assumption between initiators and responders.

- The formal-run result is really good in Rule-1.
- That's why the responder is attempting to communicate.
- However, the result is not enough in Rule-2.
- These responses have short of expanding information.

Conclusion



- Our approach can make sure of grounding in communication to Yahoo! News comments.
- The formal-run result was extremely good in Rule-1, although the approach is very simple. The result showed that It's important to be a good listener.
- Besides, the result was not enough in Rule-2 due to not to extend the dialogue, because the response has less expanding information.