

Extracting Arguments from Korean Question and Command: An Annotated Corpus for Structured Paraphrasing

Won Ik Cho[°], Young Ki Moon[†], Woo Hyun Kang[°], Nam Soo Kim[°]

Department of Electrical and Computer Engineering and INMC, Seoul National University[°]

{wicho, whkang}@hi.snu.ac.kr, nkim@snu.ac.kr

Department of Computer Engineering, Inha University[†]

ykmoon0814@gmail.com

Abstract

Intention identification is a core issue in dialog management. However, due to the non-canonicality of the spoken language, it is difficult to extract the content automatically from the conversation-style utterances. This is much more challenging for languages like Korean and Japanese since the agglutination between morphemes make it difficult for the machines to parse the sentence and understand the intention. To suggest a guideline for this problem, and to merge the issue flexibly with the neural paraphrasing systems introduced recently, we propose a structured annotation scheme for Korean question/commands and the resulting corpus which are widely applicable to the field of argument mining. The scheme and dataset are expected to help machines understand the intention of natural language and grasp the core meaning of conversation-style instructions.

1 Introduction

In a semantic and pragmatic view, questions and commands differ from interrogatives and imperatives, respectively. We can easily observe the particular types of declaratives (1a,b) which explicitly require the addressee to give an answer or to take action. Also, some rhetorical questions (1c) and commands (1d) do not require a response.

- (1) a. *I want to know why he keeps that hidden.*
 b. *I think you should go now.*
 c. *Why should you be surprised?*
 d. *Imagine what it must've been like for them.*

In identifying the intention and filling slots for conversational sentences, aforementioned characteristics make it difficult for the spoken language understanding systems to catch what the speaker intends. For these reasons, the concept of dialogue act (Stolcke et al., 2000; Bunt et al., 2010) was introduced to categorize the sentences regarding the

illocutionary act (Searle, 1976), but such elaborate categorization may not fit with managing the core content of question/commands, or the *arguments* as will be referred afterward. In this paper, discourse component (Portner, 2004) is more investigated as a key in analyzing the instructional and directive utterances, for slot-filling and dialog management.

Here, we construct a criteria set on materializing arguments from non-rhetorical questions and commands, especially annotating corpus on Seoul Korean, which is a less explored language¹. The primary goal of the resource is to encourage a **flexible management of instructions** in a dialog with non-canonical input utterances. For instance, in the questions “*Where should we go today*” and “*Where is my wallet*”, the former asks for *the destination* while the latter pursue *the location* of the object. If the above kind of distinction is performed, the dialog system may better be able to deal with the users’ needs in the circumstances regarding non-task-oriented conversation. The core component of the instructions can also be utilized in **making a plausible reaction**, such as “*I will find you the destination*”.

2 Corpus Annotation

In this section, an annotation scheme regarding the patterns of questions and commands is described. Note that punctuations were omitted assuming ASR result as an input. Briefly on the annotation scheme, for the sentences with (c)overt speech act (SA) layer of question/command, both extractive and abstractive paraphrasing are utilized depending on the content. Redundant functional particles were removed to guarantee that the output is an independent phrase.

¹For Korean text, word-level paraphrasing (Park et al., 2016) and news summarization (Jeong et al., 2016) were suggested, but little was done on structured paraphrasing.

2.1 Questions

For each question, its argument and *question type* were annotated. Here, questions include not only the interrogatives but also the declaratives with predicates such as *want to know* or *wonder*. In the annotation process, rhetorical questions (Rohde, 2006) were excluded.

Question type was tagged with three labels, namely *yes/no*, *alternative*, and *wh*-questions (Huddleston, 1994). **Yes/no** question, also known as *polar question*, has a possible answer set of *yes/no* (2a). **Alternative** question is the question which gives multiple candidates and requires a choice (2b). **Wh**-question is the type of questions regarding *wh*-particles, namely *who*, *what*, *where*, *when*, *why*, and *how* (2c-h).

- (2a) 너 의료 봉사 신청 했어
ne uylyo pongsa sincheng hayss-e
you **medical service apply** did-INT
Did you apply for medical service?
- (2b) 버스로 올거야 택시로 올거야
pesu-lo ol-keya thayksi-lo ol-keya
bus-by **come-INT** taxi-by **come-INT**
Will you come by bus or taxi?
- (2c) 오늘은 누구 왔니
onul-un nwukwu wass-ni
today-TOP **who** **came-INT**
Who came today?
- (2d) 스톡옵션이 뭔 줄 아니
suthokopsyen-i mwen cwul a-ni
stock-option-NOM **what** is.ACC know-INT
Do you know what stock option is?
- (2e) 어디 있니 로비야
eti iss-ni Robi-ya
where **be-INT** Robi-VOC
Where are you, Robi?
- (2f) 대구 몇 시에 도착이야
taykwu myech si-ey tochak-iya
Daegu **what hour-TIM** **arrival-INT**
When do you arrive in Daegu?
- (2g) 이 동네 갑자기 왜 이렇게 막히지
i tongney kapcaki way ileh-key makhi-ci
this town suddenly **why** this-like **jam-INT**
Why is this town suddenly jammed like this?
- (2h) 해외 송금 어떻게 하는 거야
hayoy songkum ettehkey hanun ke-ya
abroad remittance **how** doing thing-INT
How can I send money abroad?

Argument extraction from the questions was done depending on the question type. For *yes/no*

questions, the content was appended with the term ‘-(인)지 or 여부’ ([-(in)ci] or [yepwu], both meaning *whether or not*), to make up a nominalized term for the query (3a). For alternative questions (3b), all the items were sequentially arranged in the form of ‘(A B 중) -한/할 것’ ([(A B cwung) -han/hal kes], *what is/to do - between A and B*). For various types of *wh*-questions we tried to avoid repeating the *wh*-particles in the extraction and instead used the *wh*-related terms such as ‘사람’ ([sa-lam], *person*), ‘의미’ ([uy-mi], *meaning*), ‘위치’ ([wi-chi], *place*), ‘시간’ ([si-kan], *time*), ‘이유’ ([i-yu], *reason*), ‘방법’ ([pang-pep], *method*) to guarantee the structuredness of the extraction and the utility for further usages such as web searching (3c-h). The results below correspond with the sentences (2a-h).

- (3a) 의료 봉사 신청 여부
uylyo pongsa sincheng yepwu
medical service apply presence
Whether or not applied to medical service
- (3b) 버스 택시 중 타고² 올 것
pesu thayksi cwung tha-ko ol kes
bus taxi between **ride-PRG** **come** thing
What to ride between bus and taxi
- (3c) 오늘 온 사람
onul on salam
today **came** person
The person who came today
- (3d) 스톡옵션 의미
suthokopsyen uyumi
stock-option meaning
The meaning of stock option
- (3e) 지금 있는 위치
cikum iss-nun wichi
now **be-PRG** place
The place currently belong to
- (3f) 대구 도착 시간
taykwu tochak sikan
Daegu **arrival** time
Arrival time for Daegu
- (3g) 막히는 이유
makhi-nun iyu
jam-PRG reason
The reason for jam
- (3h) 해외 송금 방법
hayoy songkum pangpep
abroad remittance method
The way to send money abroad

²타-/ride is usually accompanied with the transportation.

2.2 Commands

For each command, its argument and the *negativeness* were annotated. Here, commands include not only the imperative forms with covert subject and the requests in the interrogative form (different from the categorization in Portner (2004)), but also the wishes and exhortatives that induce the addressee’s response. Imperatives used as exclamation or evocation are not included since they are considered rhetorical. The optatives that are used idiomatically, such as *Have a nice day!* (Han, 2000), are also not included since the feasibility of the to-do-lists is beyond the addressee’s capacity.

Negativeness was tagged with three labels, namely prohibitions, requirements, and strong requirements. **Prohibition (PH)** is the type of command that stops or prohibits an action. It possibly contains negations (4a1) or the predicates/modifiers that induce the prohibition (4a2). **Requirement (REQ)** is the type of command that is positive, with no terms that induce the restriction (4b1), and corresponds with various sentence forms aforementioned. The imperatives with information-seeking intent (4b2) are treated separately as a question. **Strong requirement (SR)** is the type of command where the prohibition and requirement are concatenated sequentially, appearing in spoken Korean as an emphasis (4c)³.

- (4a1) 태풍 오니까 **밖에** 나가지 마
 thayphwung o-nikka **pakk-ey naka-ci** ma
 typhoon come-because **outside-to go-ci** NEG
Don’t go outside, typhoon comes.
- (4a2) **안전띠** 안**매**면 큰일나
ancentti an-may-myen khunil-na
seatbelt no-take-if danger-occur.DEC
It’s dangerous if you don’t take a seatbelt.
- (4b1) **인적사항** **확인** 바랍니다
incksahang hwakin palap-nita
personal-info check want-HON.DEC
I want you to check the personal info.
- (4b2) 이번 주 일정을 모두 말해
ipen cwu ilceng-ul motwu mal-hay
this week schedule-ACC all tell-IMP
Tell me all the schedules this week.
- (4c) 욕심부리지 말고 지금 팔아
 yoksim-pwuli-ci malko **cikum phal-a**
 greedy-be-ci not-and **now sell-IMP**
Don’t be greedy, just sell it now!

³In English, the order is generally reversed, as in *I told you to slay the dragon, not lay it*.

	Types		Correspondings
Questions	Yes/no		whether or not -(인)지, 여부
	Alternative		what is/to do between -랑 -중 -한/할 것
	Wh- questions	Who	person, identity 사람, 정체
		What	meaning 의미
		Where	location, place 위치, 장소
		When	time, period, hour 시간, 기간, 시각
		Why	reason 이유
Commands	How		method, measure 방법, 대책
	Prohibitions		Prohibition: not to - -지 않기 (금지)
	Requirements		Requirement: -ing -기 (요구)
	Strong Requirements		Requirement: -ing -기 (요구)

Table 1: Structured annotation scheme.

Argument extraction from the commands was done with a nominalized predicate ‘-하(지 않)기’ ([-ha-(ci ahn)-ki], *doing (not to do) something*). For PH, the action that is prohibited is annotated with a negation (5a1). For REQ, the requirement is annotated (5b1), and information-seeking ones are dealt as questions (5b2). For SR we only annotated the action that is required (5c), for disambiguation and an effective representation of a to-do-list.

- (5a1) **밖에** 나가지 않기 (금지)
pakk-ey naka-ci anh-ki
outside-to go-ci not-NMN⁴
Not to go outside (prohibition)
- (5a2) **안전띠** 매기 (요구)
ancentti may-ki
seatbelt take-NMN
Taking a seatbelt (requirement)
- (5b1) **인적사항** **확인**하기 (요구)
incksahang hwakin-haki
personal info check-NMN
Checking the personal info (requirement)
- (5b2) 이번 주 모든 일정
ipen cwu motun ilceng
this week all schedule
The schedule of this week (wh- question)
- (5c) **지금** 팔기 (요구)
cikum phal-ki
now sell-NMN
Selling it now (requirement)

⁴Denotes a nominalizer.

	Types	Portion
Questions (17,869)	<i>Yes/no</i>	5,718 (31.99%)
	<i>Alternative</i>	227 (1.27%)
	<i>Wh- question</i>	11,924 (66.73%)
Commands (12,968)	<i>Prohibition</i>	477 (3.67%)
	<i>Requirement</i>	12,369 (95.38%)
	<i>Strong requirement</i>	122 (0.94%)

Table 2: Dataset specification, denoted with the number of instances for each category and the portion. In the disclosed dataset, six types of sentences are randomly distributed, with the labels 0 to 5 in the order stated in the table.

There are points to be clarified regarding (4a2) and (5a2). Although (4a2) displays a property of prohibition induced by ‘큰일나 (danger occurs)’, the target action contains a negation ‘안’ which induces a double negation. Therefore, (5a2) was labeled as SR.

Since the commands hardly accompany abstract concept as *wh*-questions do, the arguments were obtained mostly in an extractive way. Also, since the command inevitably includes a detailed to-do-list, the removal of functional particles was done only if they were considered redundant, unlike it was highly recommended for the questions.

3 Dataset Specification

We adopted the spoken Korean dataset of size 800K which was primarily constructed for language modeling and speech recognition of Korean. The sentences are in conversation-style and partly non-canonical, and the content covers topics such as weather, news, housework, e-mail, and stock. From the corpus we randomly selected 20K sentences and classified them into seven sentence types: fragments, rhetorical questions, rhetorical commands, questions, commands, and statements, with the inter-annotator agreement (IAA) of $\kappa = 0.85$ (Fleiss, 1971). Questions and commands were chosen among them, and later, additional sets of questions and commands were augmented via manual generation, to make up the whole dataset of size 30,837.

The specification of the annotated corpus is displayed in Table 2. Since the annotation is quite explicitly defined for both question and command in view of discourse component (Portner, 2004), we performed a double-check instead of finding out a separate IAA.

Due to the characteristics of the adopted corpus as a spoken language script targeting smart home agents, the portion of straight questions and commands (yes/no-*wh*-questions and REQ) is much higher than in the real-life language. We observed that the alternative questions, PH, and SR (especially the scrambled order and double negation) are relatively scarce compared with the portion within the human conversation, which will be augmented via crowd-sourcing in the future work.

4 Conclusion

In this paper, we proposed a structured annotation scheme for the argument extraction of conversation-style Korean questions and commands, concerning the discourse component they show. This is the first dataset on question set/to-do-list extraction for spoken Korean, up to our knowledge, and we annotated the syntax-related properties for the potential usage. This study may provide an appropriate guideline that helps extract an argument from the various non-canonical type of instructions in real life.

Despite the small volume, the dataset incorporates consistency in the way it was constructed. Thus, in case of need, utterance-argument pairs can be created without difficulty referring to the examples and be augmented to the original corpus. Moreover, for easier construction, merely some arguments can be provided to the participants so that they create conversation-style question/commands with no regulation (e.g., generating “Tell me where my phone is” from ‘the location of the speaker’s phone’). Here, the arguments that are frequently exploited in AI services can be adopted so as to boost the industrial utility of the corpus.

In the aspect of linguistic characteristics, the annotation scheme can be extended to the languages that are morphologically rich and syntactically similar to Korean, such as Japanese. Expansion to other languages such as English, by utilizing the terms *if*-, *whether*-, or *the place/reason*, etc., is also expected to be available, though the methodology may be less impactful than in the aforementioned languages. Nevertheless, the scheme can be adopted by the languages where the act of question/command presents, and fits well with the spoken language analysis flourishing with the smart agents widely used nowadays. The dataset and scheme are freely available on-line⁵.

⁵<https://github.com/warnikchow/sae4k>

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