# MUD(Meeting Using DeepLearning)

*Summet(인공지능 자동 회의 요약)*

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# Abstractive 요약

**(1)의미**

추상적 요약이란 문헌의 내용을 잘 반영할 수 있는 추상적인 문장을 직접 생성함으로써 요약문 생성

**(2) Abstractive 요약 vs Extractive 요약**

→추출 적 요약 = 구 or 문장 추출 하는데 요약문의 응집도 또는 가독성 확보하는데 어려움이 있다.

→ 생성 요약 경우 입력 문서에 문서 전체를 대표하는 문장이 없을 경우 매우 유용하다.

최근 딥 러닝 기반의 ***자연어처리 기술이 발전하면서*** abstractive 요약에 대한 도전이 등장 하고 있다.

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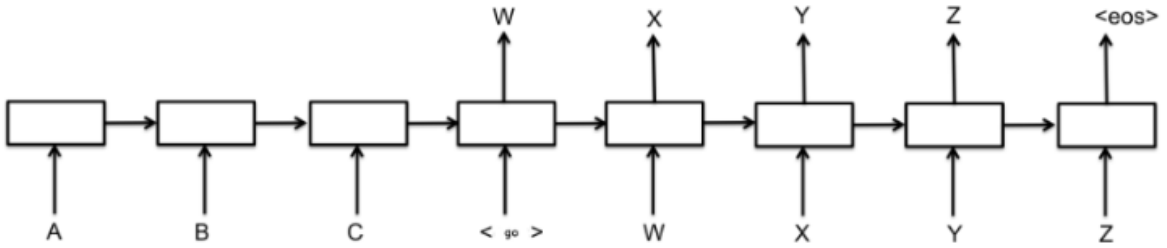
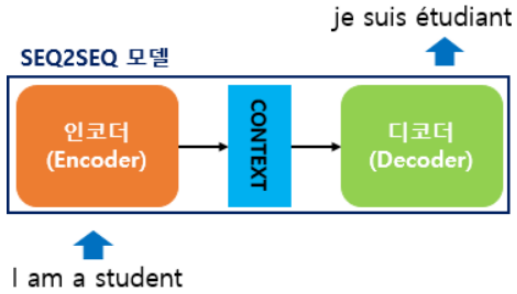
# Sequence-to-Sequence 모델

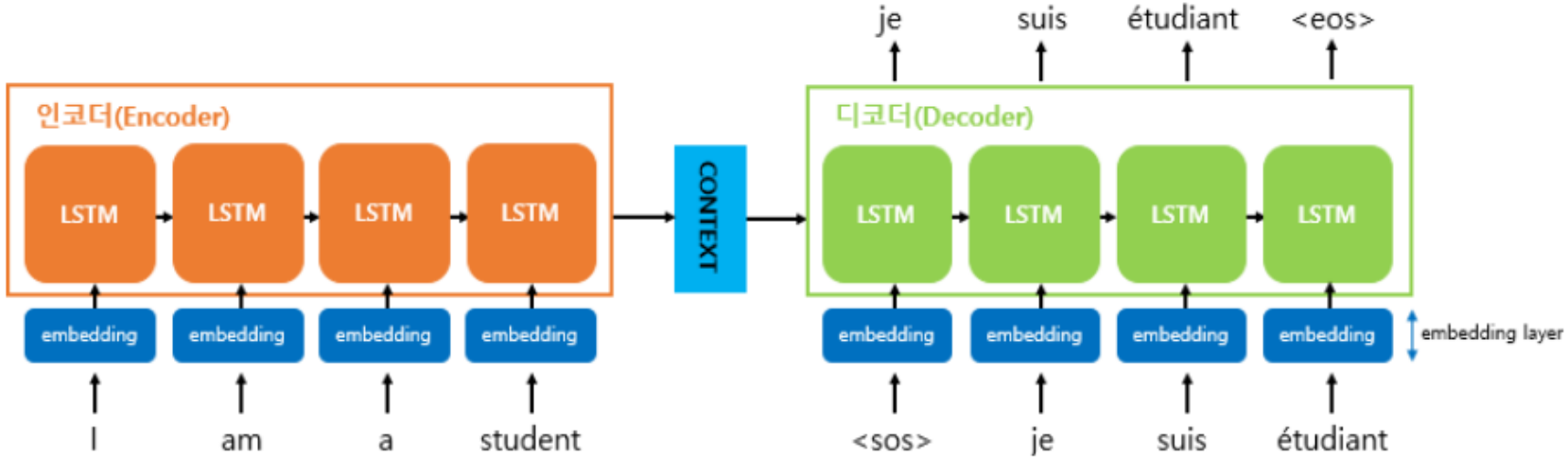



<seq2seq의 기본 구조>




<seq2seq의 모델 내부>

<seq2seq의 모델 내부 확대[context vector=4]>



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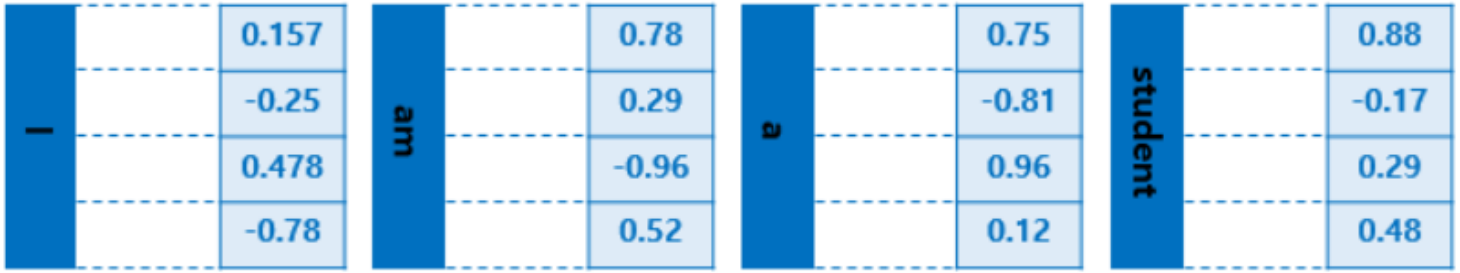
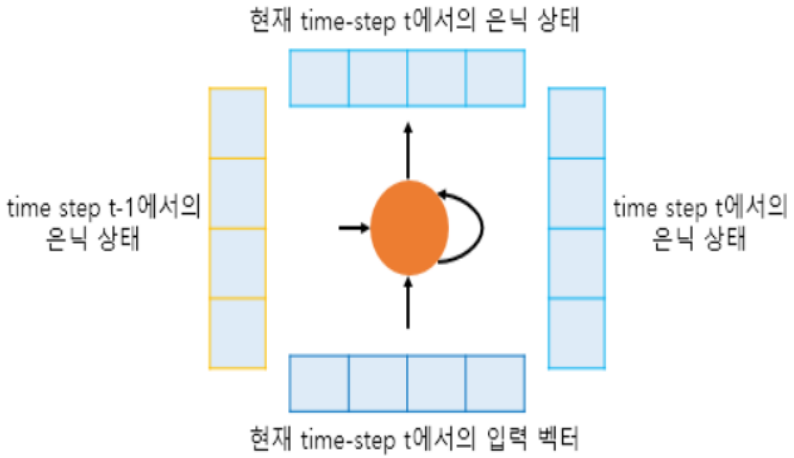
# Sequence-to-Sequence 모델

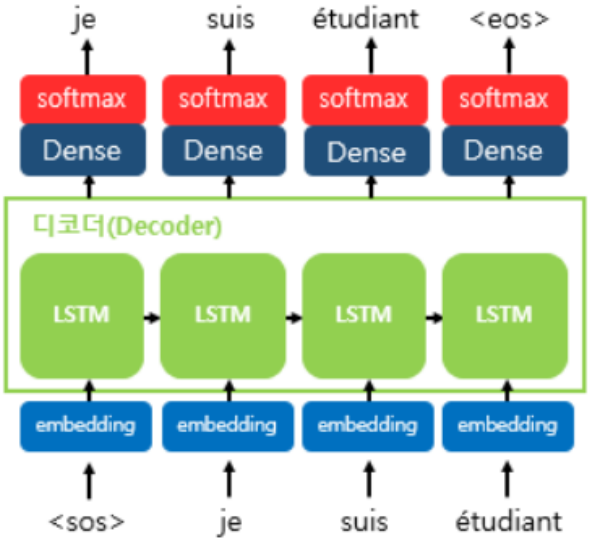
<word embedding>




<RNN Cell>




<디코더 다음 단어 예측>



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# Attention mechanism

## Seq2seq 모델의 문제점

**정확성 떨어짐**

Input 값 모두에 집중함

**정보 손실**

원인 = 하나의 고정된 크기의 벡터에 모든 정보 압축

**기울기 손실**

RNN의 고질적인 문제인 기울기 소실을 (Vanishing Gradient) 문제가 존재한다

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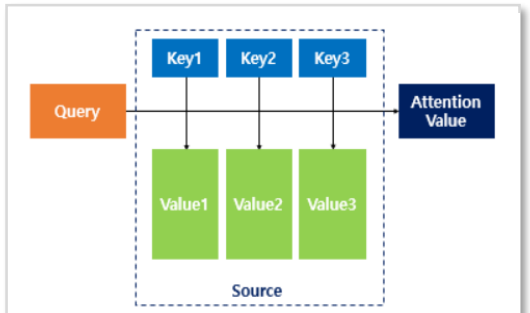
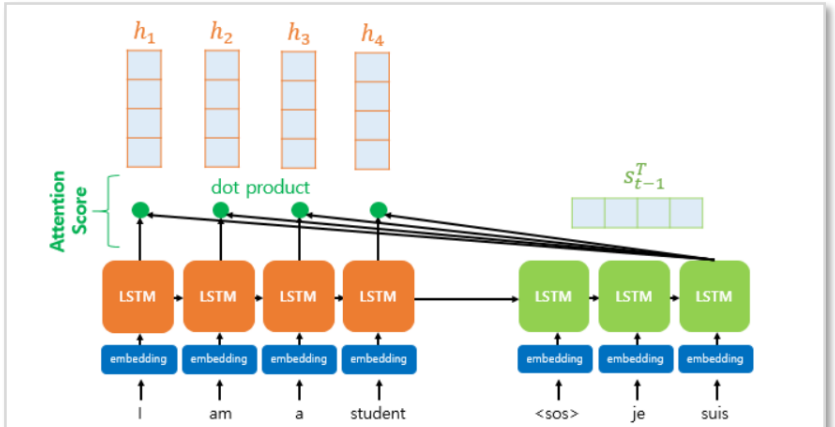
# Attention mechanism




**Attention(Q, K, V) = Attention Value**

**Q** = Query : t-1 시점의 디코더 셀에서의 은닉 상태
**K** = Keys : 모든 시점의 인코더 셀의 은닉 상태들
**V** = Values : 모든 시점의 인코더 셀의 은닉 상태들

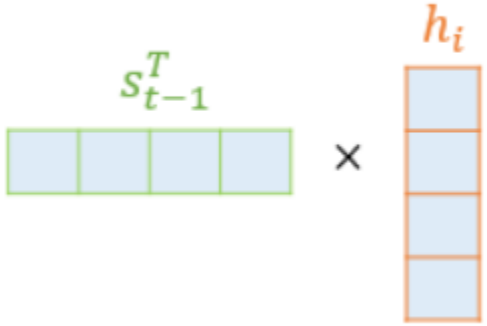



**Attention Score**

$s_t = f(s_{t-1}, y_{t-1})$

$s_t = f(s_{t-1}, y_{t-1}, a_t)$

**Attention Score2**




$$score(s_{t-1}, h_i) = s_{t-1}^T h_i$$

$$e^t = [s_{t-1}^T h_1, \ldots, s_{t-1}^T h_N]$$

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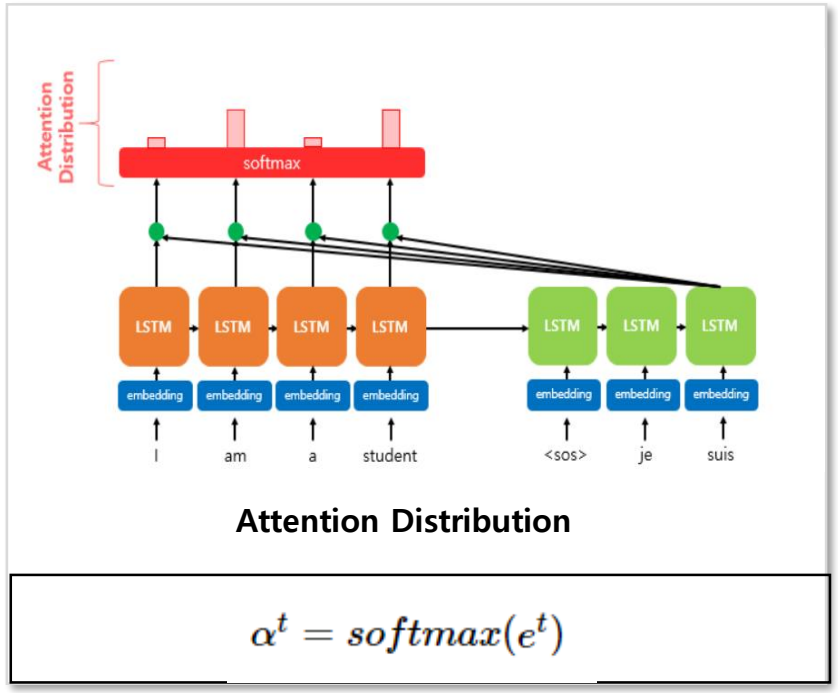
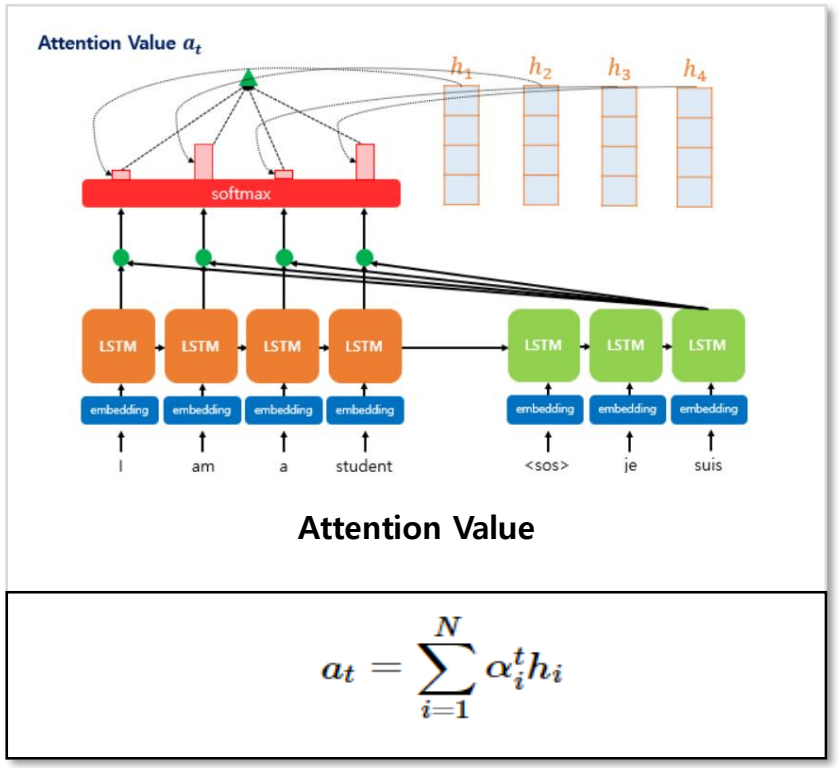
# Attention mechanism



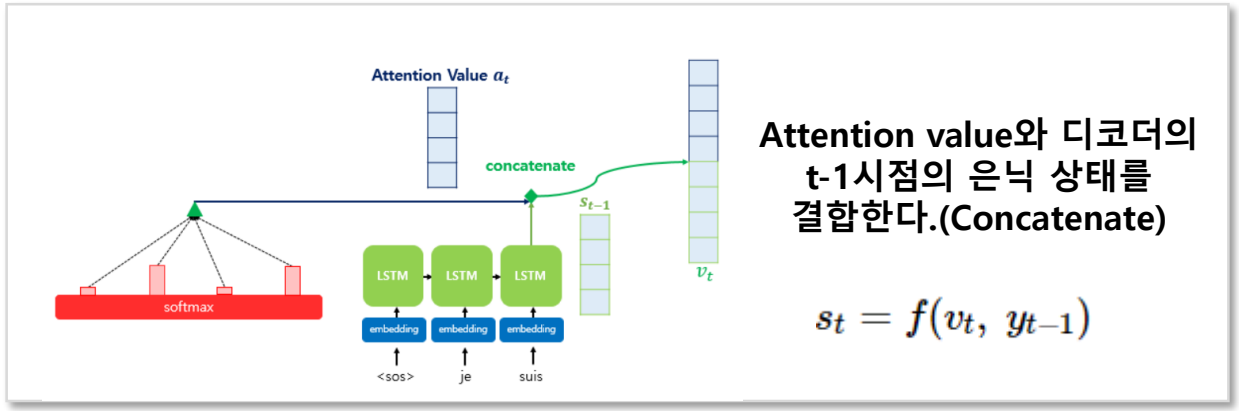

**Attention Distribution**

$$\alpha^t = softmax(e^t)$$




**Attention Value**

$$a_t = \sum_{i=1}^{N} \alpha_i^t h_i$$




**Attention value와 디코더의 t-1시점의 은닉 상태를 결합한다.(Concatenate)**

$$s_t = f(v_t,\ y_{t-1})$$

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# Test

## 기계 번역(Neural Machine Translation)

- 데이터 전처리 과정

| | src | tar |
|---|---|---|
| 7054 | Call a plumber. | Appelez un plombier ! |
| 58062 | Do I look like a plumber? | Ai-je l'air d'un plombier ? |
| 39931 | I admit I wasn't sure. | J'admets que je n'étais pas sûr. |
| 21559 | Why not try it on? | Pourquoi ne pas l'essayer ? |
| 30834 | They don't have one. | Elles n'en ont pas. |
| 8538 | Leave me alone. | Laisse-moi tranquille. |
| 52635 | I cannot possibly do it. | Il m'est impossible de le faire. |
| 5294 | I felt scared. | Je me sentis apeurée. |
| 56303 | Tom was shot in the leg. | Tom a été blessé par balle à la jambe. |
| 37247 | Tom was a journalist. | Tom était un journaliste. |

현재 데이터 구성 sample

| | src | tar |
|---|---|---|
| 53686 | I want to do this alone. | \t Je veux faire ça seule. \n |
| 39614 | He may be sick in bed. | \t Il est peut-être souffrant. \n |
| 37364 | We can seat you soon. | \t Nous allons vous trouver une place bientôt. \n |
| 8879 | That's my beer. | \t C'est ma bière. \n |
| 28597 | I have good hearing. | \t J'ai de bonnes oreilles. \n |
| 53768 | I wanted you to do that. | \t Je voulais que vous fassiez cela. \n |
| 48654 | Should we wait for Tom? | \t Devrions-nous attendre Tom ? \n |
| 40136 | I do have one request. | \t J'ai effectivement une demande. \n |
| 24893 | She became a woman. | \t Elle est devenue une femme. \n |
| 22425 | Don't be a copycat. | \t Ne sois pas un imitateur. \n |

'₩t'를 시작 심볼, '₩n'을 종료 심볼

```
encoder [[30, 64, 10], [31, 58, 10],
[31, 58, 10], [41, 70, 63, 2], [41, 70, 63, 2]]

decoder [[1, 3, 48, 53, 3, 4, 3, 2],
[1, 3, 45, 53, 64, 73, 72, 3, 4, 3, 2],
[1, 3, 29, 67, 73, 70, 71, 105, 4, 3, 2],
[3, 45, 53, 64, 73, 72, 3, 4, 3, 2],
[3, 29, 67, 73, 70, 71, 105, 4, 3, 2],
```

정수 인코딩,디코딩 sample

# Test

## 기계 번역(Neural Machine Translation)

- seq2seq 모델 설계 & 결과

<loss 비율>

```
27072/48000 [===============>..............] - ETA: 1:24 - loss: 0.9325
27136/48000 [===============>..............] - ETA: 1:24 - loss: 0.9319
27200/48000 [===============>..............] - ETA: 1:24 - loss: 0.9313
27264/48000 [===============>..............] - ETA: 1:24 - loss: 0.9307
27328/48000 [===============>..............] - ETA: 1:23 - loss: 0.9300
27392/48000 [===============>..............] - ETA: 1:23 - loss: 0.9293

 7488/48000 [===>..........................] - ETA: 3:05 - loss: 0.3689
 7552/48000 [===>..........................] - ETA: 3:05 - loss: 0.3686
 7616/48000 [===>..........................] - ETA: 3:04 - loss: 0.3685
 7680/48000 [===>..........................] - ETA: 3:04 - loss: 0.3684
 7744/48000 [===>..........................] - ETA: 3:04 - loss: 0.3685

47744/48000 [============================>.] - ETA: 4s - loss: 0.1988
47808/48000 [============================>.] - ETA: 3s - loss: 0.1987
47872/48000 [============================>.] - ETA: 2s - loss: 0.1987
47936/48000 [============================>.] - ETA: 1s - loss: 0.1988
```

<결과>

```
----------------------------------
입력 문장: Run!
정답 문장:  Cours !
번역기가 번역한 문장:  Tautes !
----------------------------------
입력 문장: I lost.
정답 문장:  J'ai perdu.
번역기가 번역한 문장:  J'ai eu dit.
----------------------------------
입력 문장: Come in.
정답 문장:  Entre !
번역기가 번역한 문장:  Viens !
----------------------------------
입력 문장: I got it.
정답 문장:  J'ai capté.
번역기가 번역한 문장:  Je me suis senti déprimé.
----------------------------------
입력 문장: What else?
정답 문장:  Quoi d'autre ?
번역기가 번역한 문장:  Qu'est-ce qui vous a réveillé ?
```

```
48000/48000 [==============================] - 855s 18ms/step - loss: 0.1987 - val_loss: 0.3669
```

# Test

## 기계 번역(Neural Machine Translation)

- Attention mechanism 추가 설계 & 결과

< parallel corpus>

```
Reading lines...
Read 170190  sentence pairs
Trimmed to 12972 sentence pairs
Counting words...
Counted words:
fra 4489
eng 3177
['tu es tellement gentille ! .', 'you re so sweet .']
```

```
Reading lines...
Read 170190  sentence pairs
Trimmed to 12972 sentence pairs
Counting words...
Counted words:
fra 4489
eng 3177
['tu es tellement gentille ! .', 'you re so sweet .']
9m 24s (- 131m 48s) (5000 6%) 2.9252
18m 59s (- 123m 25s) (10000 13%) 2.3934
28m 36s (- 114m 24s) (15000 20%) 2.0574
38m 36s (- 105m 25s) (20000 26%) 1.8309
48m 6s (- 96m 13s) (25000 33%) 1.6492
57m 53s (- 86m 50s) (30000 40%) 1.4618
67m 39s (- 77m 19s) (35000 46%) 1.3657
77m 29s (- 67m 48s) (40000 53%) 1.2518
87m 15s (- 58m 10s) (45000 60%) 1.1463
```

< model train>

```
> c est un membre estime .
= he is a member in good standing .
< he is a in in good . <EOS>

> tu es tres observatrice .
= you re very observant .
< you re very observant . <EOS>

> je suis tres heureux de ton travail .
= i m very pleased with your work .
< i m very pleased with your work . <EOS>
```

<random evaluation>

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# 앞으로의 계획

## Data set

Seq2seq모델은 input과 output을 주어 훈련을 시켜야 하기 때문에 두 쌍에 대한 data 모두 존재 해야 한다.

## 추출적 요약

추상적 요약의 단점은 추출적 요약에 비해 요약의 정확도가 떨어 질 수 있다.

## 특정 단어 재활용

문서 요약 단계에서 특정 단어가 재활용 되는 문제점이 있다.

## 구어체

문어체와 달리 구어체는 줄임말이나 맞춤법 오류가 많고 띄어쓰기가 맞지 않는 등 문제점이 많다..

# 참고 문헌

https://bab2min.tistory.com/625 →**extractive vs abstractive summarization**
https://reniew.github.io/31 → **Learning Phrase Representations using RNN Encoder–Decoder for Statistical Machine Translation**

file:///C:/Users/vallo/Downloads/%EA%B0%90%EC%A0%95%EC%A0%90%EC%88%98%EB%A5%BC%20%ED%99%9C%EC%9A%A9%ED%95%9C%20%EC%8B%9C%ED%80%80%EC%8A%A4-%ED%88%AC-%EC%8B%9C%ED%80%80%EC%8A%A4%20%EA%B8%B0%EB%B0%98%20%ED%85%8D%EC%8A%A4%ED%8A%B8%20%EC%9A%94%EC%95%BD%20(1).pdf
https://chunml.github.io/ChunML.github.io/project/Sequence-To-Sequence/
https://reniew.github.io/31/
http://kism.or.kr/file/memoir/8_2_7.pdf
→ **seq2seq 기술 설명**

https://www.dbpia.co.kr/journal/articleDetail?nodeId=NODE08763262
http://docs.likejazz.com/attention/
http://kism.or.kr/file/memoir/8_2_7.pdf
https://wikidocs.net/24996
→ **attention mechanism 설명**

http://www.manythings.org/anki
https://sacko.tistory.com/2 → **deeplearning 개요**
https://blog.keras.io/a-ten-minute-introduction-to-sequence-to-sequence-learning-in-keras.html
https://wikidocs.net/24996
https://9bow.github.io/PyTorch-tutorials-kr-0.3.1/intermediate/seq2seq_translation_tutorial.html
→**번역(영어-프랑스)**

https://brunch.co.kr/@kakao-it/139 → **attention mechanism의 문제 보완**

# THANK YOU!