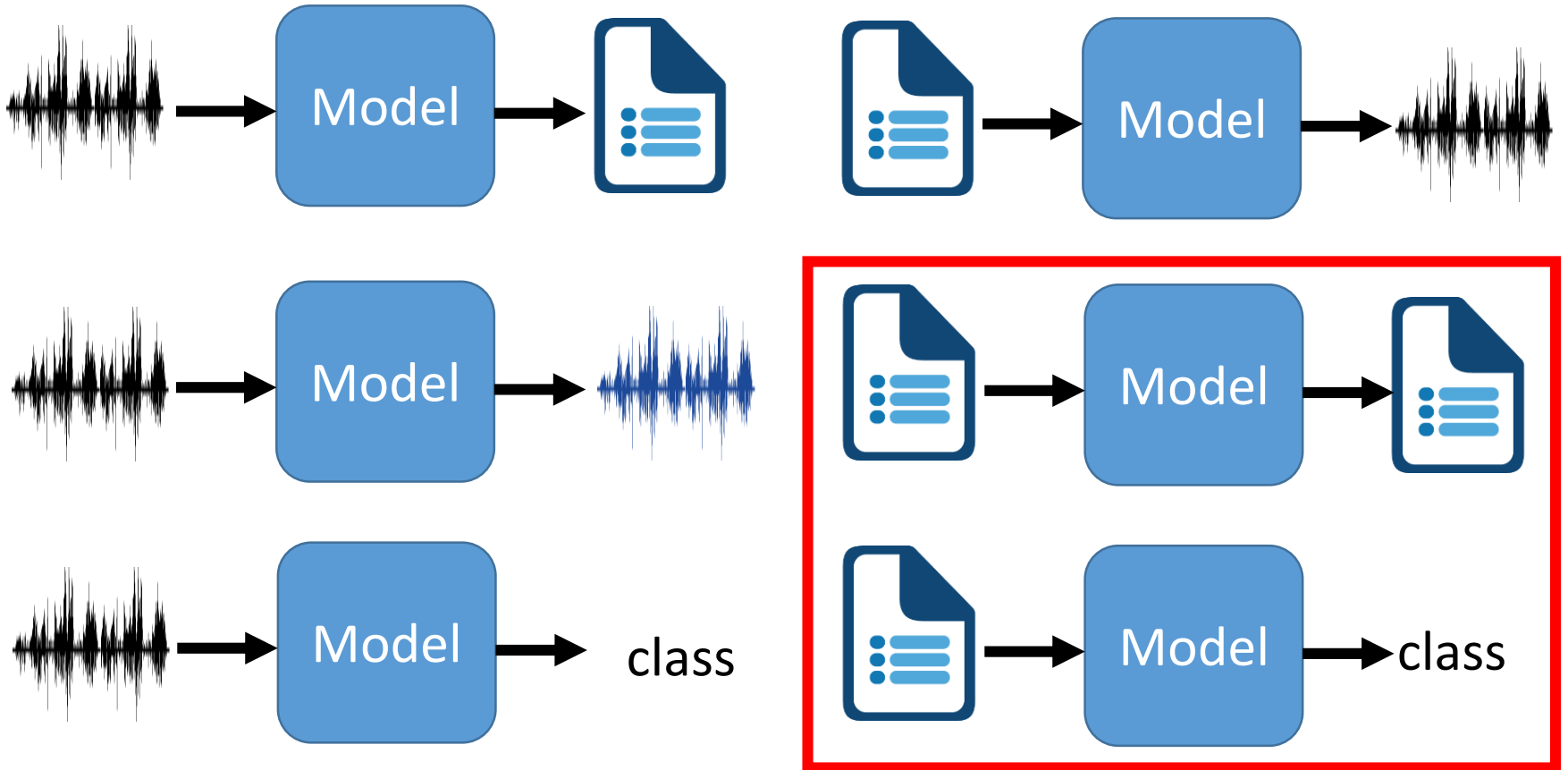


# NLP Tasks

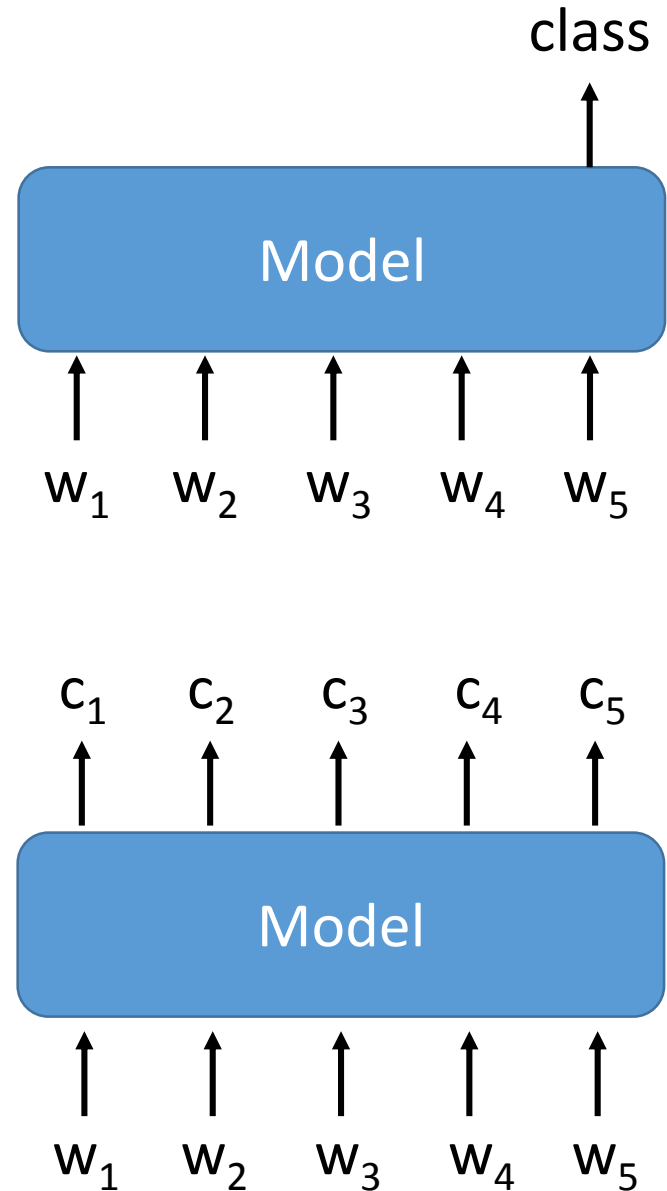
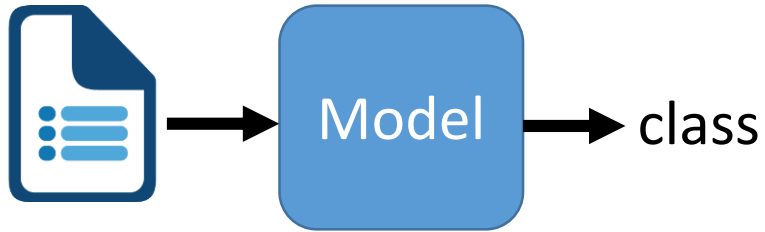
Hung-yi Lee

# One slide for this course

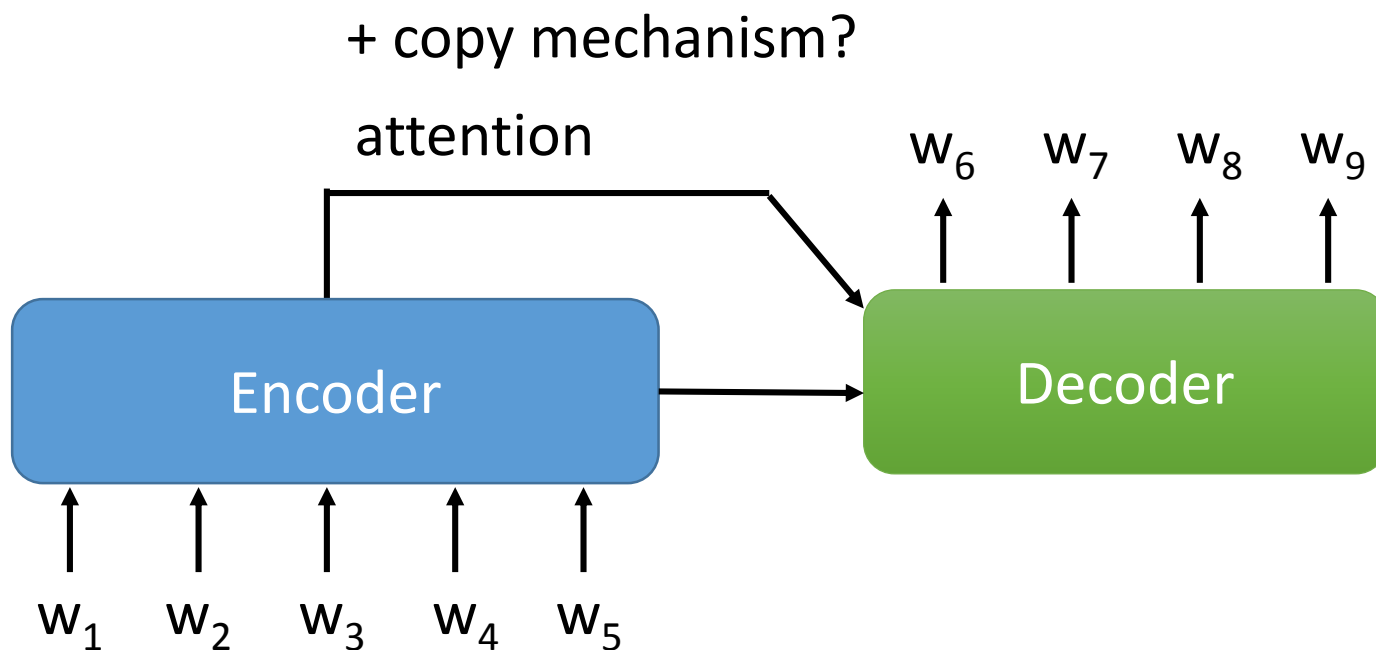
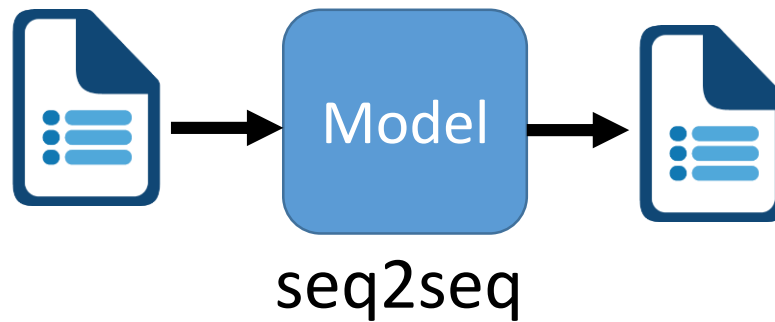


Usually people call them “NLP” tasks.

# Category

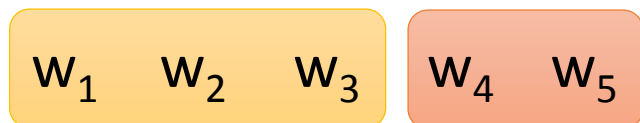


# Category

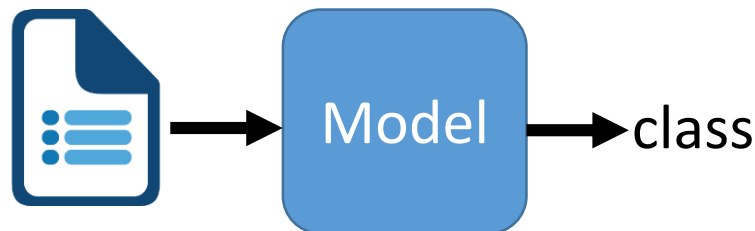
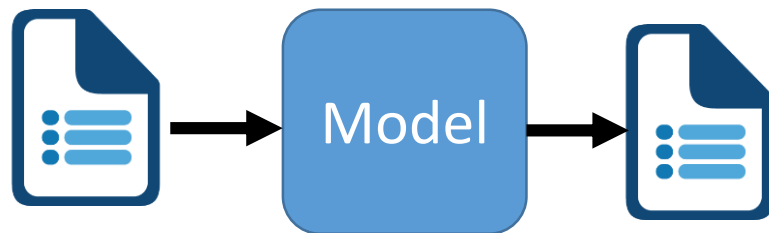
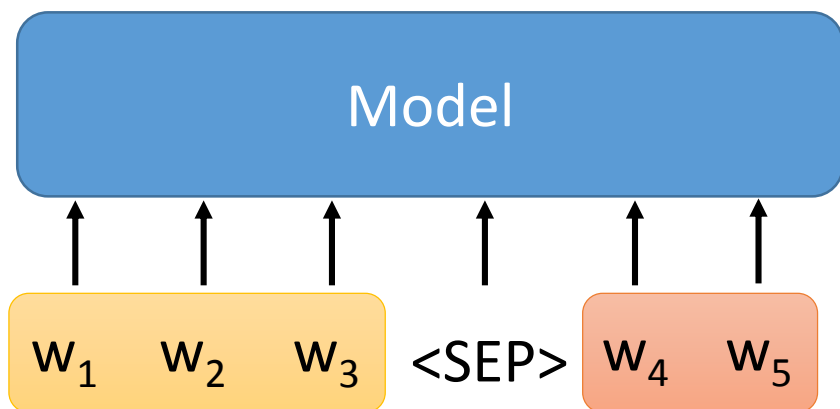


# Category

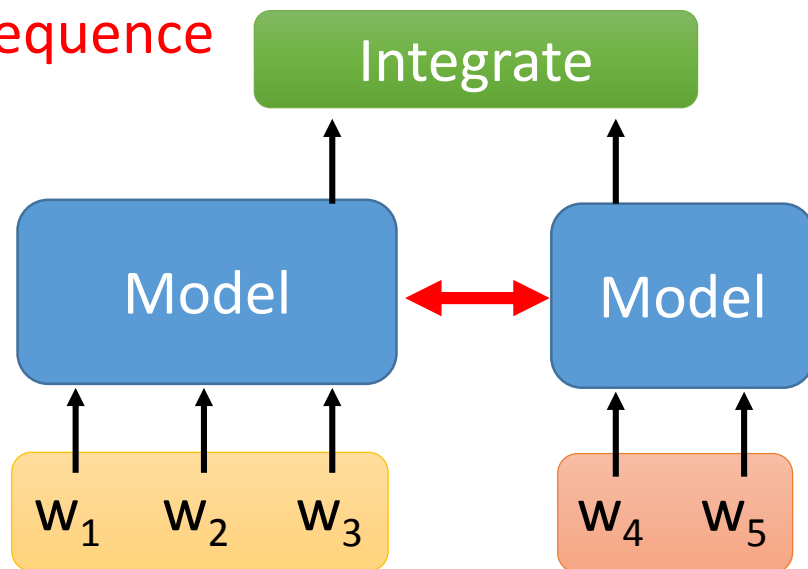
What happy if there are more than two input sequences?



Simply concatenate ...

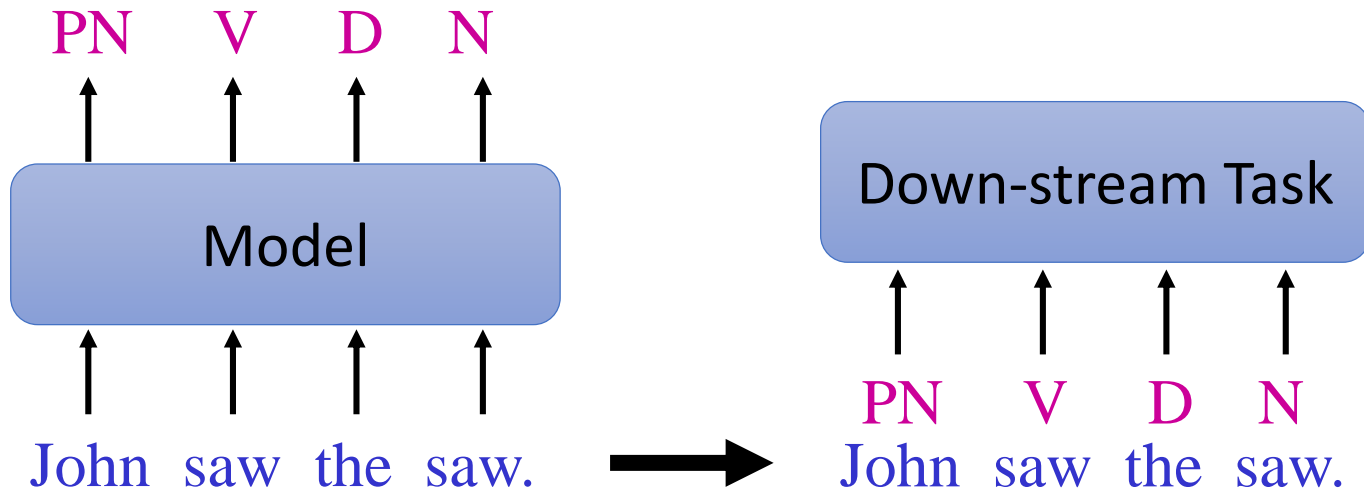


Attention between  
sequence



# Part-of-Speech (POS) Tagging

- Annotate each word in a sentence with a part-of-speech (e.g. Verb, Adjective, Noun)



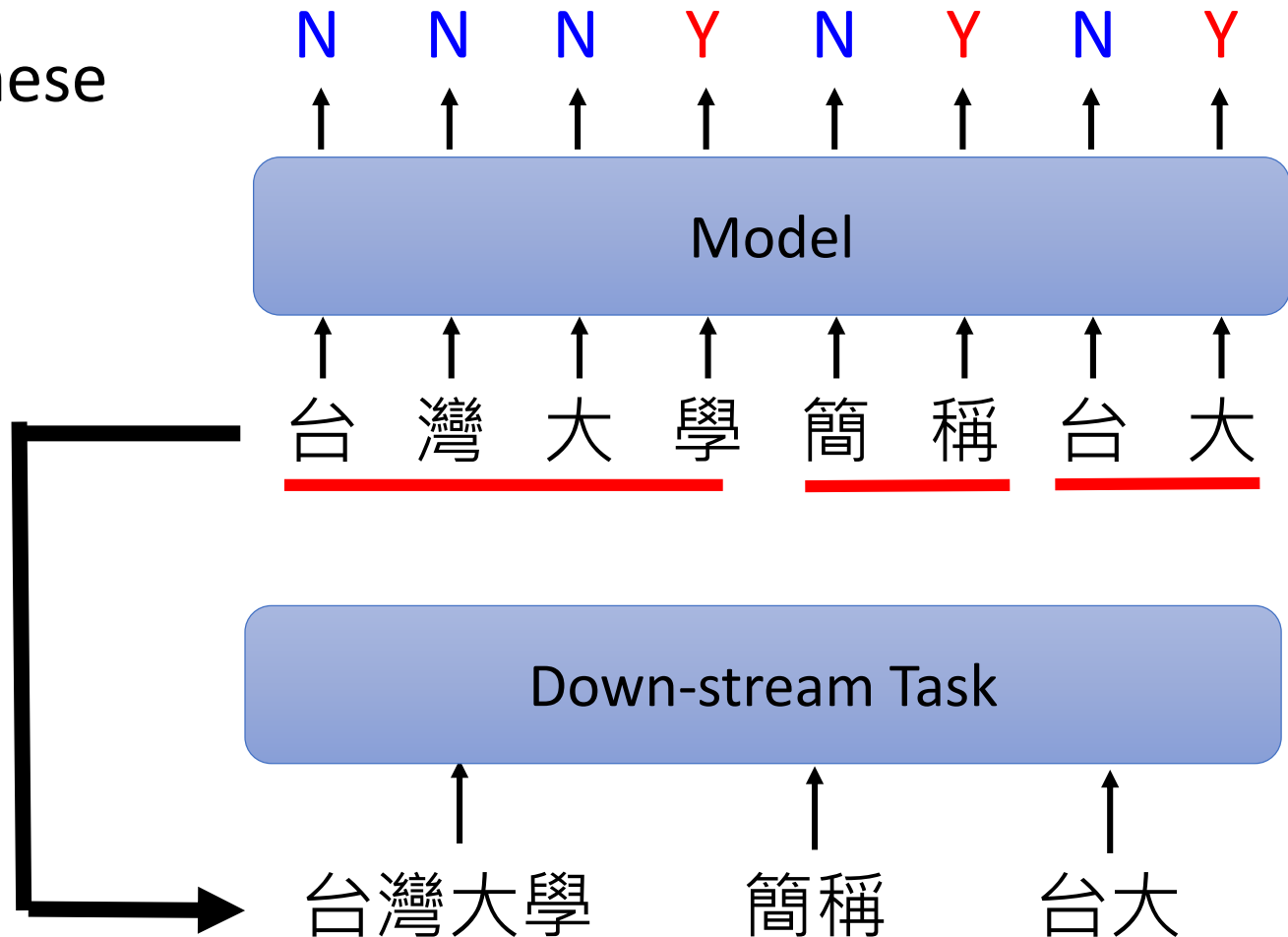
Input: sequence

Output: class for each token

# Word Segmentation

Input: sequence  
Output: class for each token

- for Chinese



『楊公再興之神』

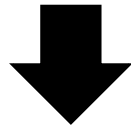
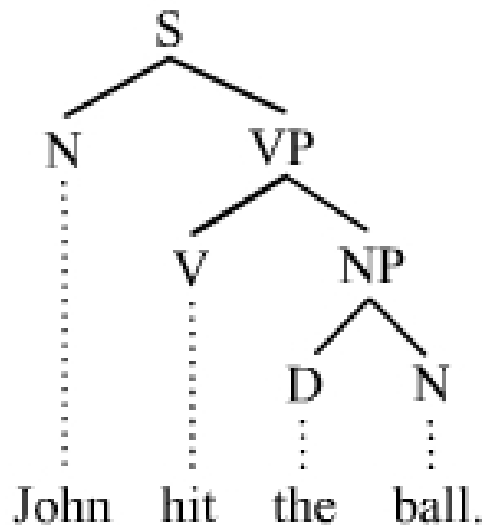
(出自《笑傲江湖》)



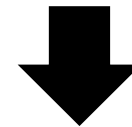
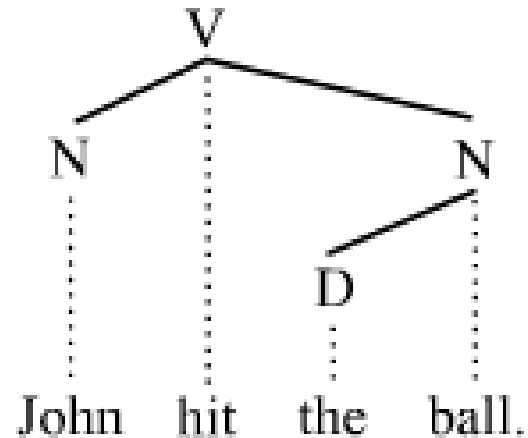
# Parsing

Outlier?

## Constituency Parsing



## Dependency Parsing



The results of parsing can be used in the downstream tasks.

# Coreference Resolution (指代消解)

Outlier?

Paul Allen was born on January 21, 1953. He attended Lakeside School, where he befriended Bill Gates. Paul and Bill used a teletype terminal at their high school, Lakeside, to develop their programming skills on several time-sharing computer systems.

Source of example:

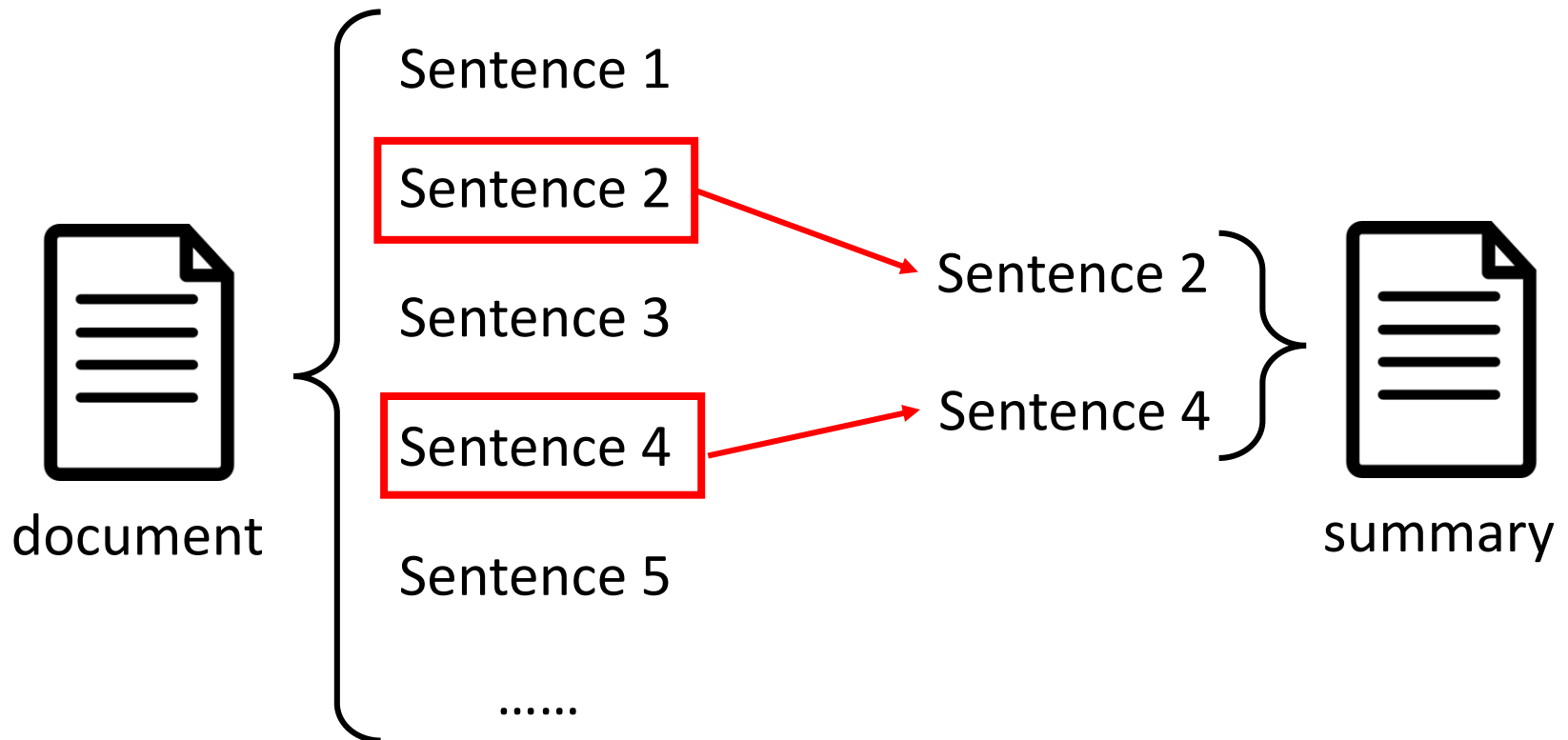
<https://demo.allennlp.org/coreference-resolution/>

# Summarization

Input: sequence  
Output: class for each  
token

- **Extractive** summarization

(Here a token is a  
sentence)

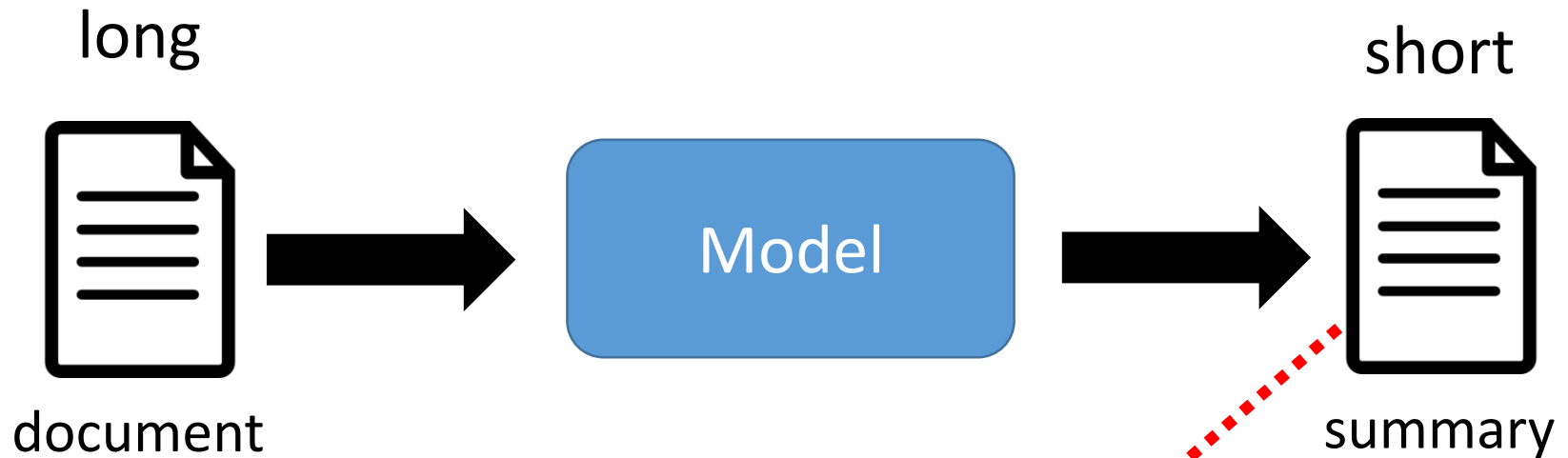


# Summarization

- **Abstractive** summarization

Input: sequence  
Output: sequence

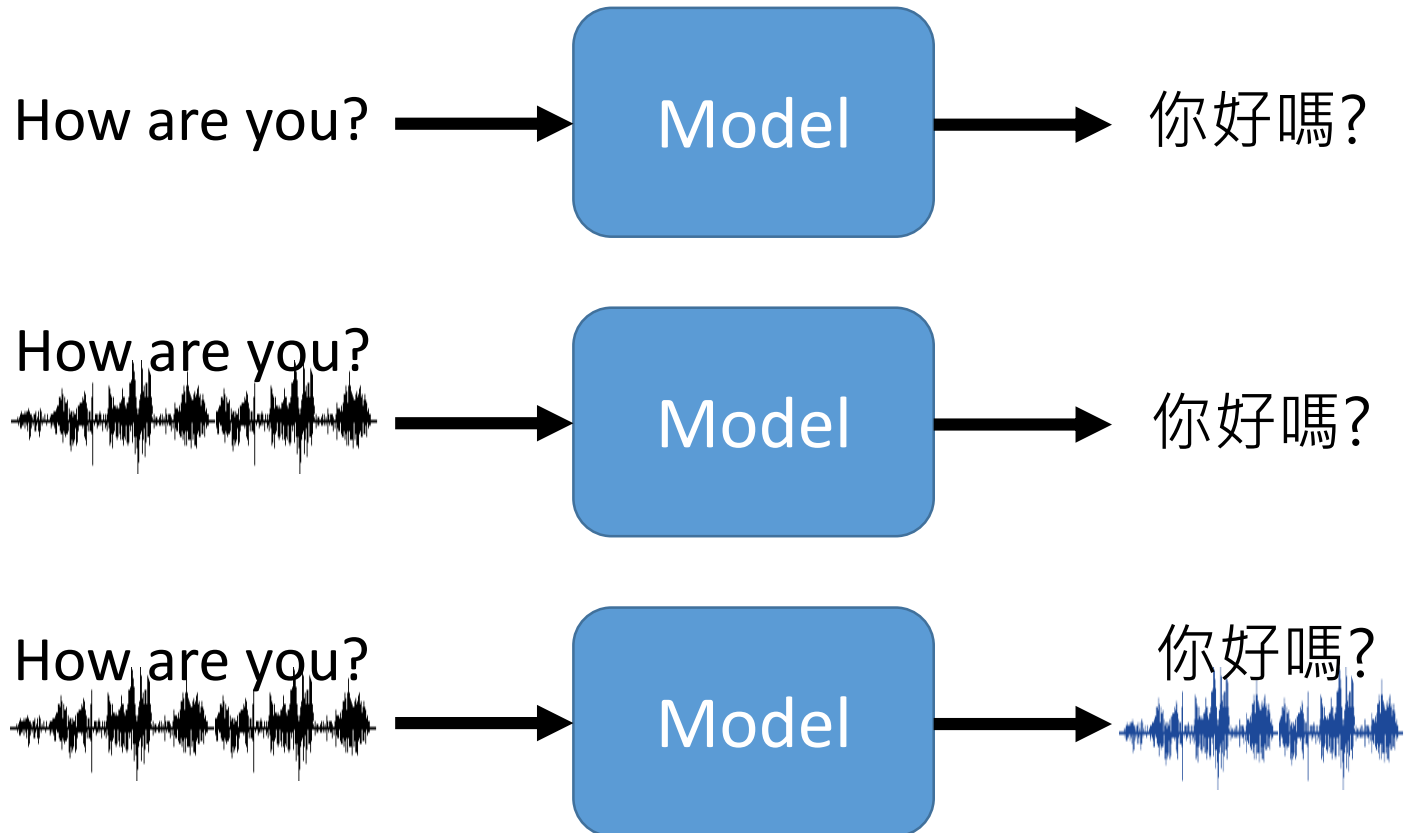
(copy is encouraged)



Pointer network:  
encouraging direct copy from input

# Machine Translation

Input: sequence  
Output: sequence



Unsupervised machine translation is a critical research direction.

# Grammar Error Correction

I am good.



Model



I are good.

Input: sequence

Output: sequence

(copy is encouraged)

Example 1	
x	[ Bolt can have run race ]
y	[ Bolt could have run the race ]
diff	(C,[]) (C,Bolt) (D,can) (I,can,could) (C,have) (C,run) (I,run,the) (C,race) (C,)
e	C C R(could) C A(the) C C ↑ ↑ ↑ ↑ ↑ ↑ [ Bolt can have run race ]
Example 2	
x	[ He still won race ! ]
y	[ However , he still won ! ]
diff	(C,[]) (I,[,However, ) (D,He) (I,He,he) (C,still) (C,won) (D,-race) (C,!) (C,)
e	A(However, ) T_case C C D C C ↑ ↑ ↑ ↑ ↑ ↑ [ He still won race ! ]

Source of image:

<https://www.aclweb.org/anthology/D19-1435.pdf>

# Sentiment Classification

Input: sequence  
Output: class

柯南劇場版《紺青之拳》還蠻有趣的



柯南劇場版《紺青之拳》槽點很多



柯南劇場版《紺青之拳》雖然槽點很多，但還蠻有趣的



柯南劇場版《紺青之拳》雖然還蠻有趣的，但槽點很多



# Stance Detection

Input: two sequences  
Output: a class

Source: 李宏毅是個型男 (post on twitter or FB)

Replay: 他只是個死臭酸宅



**DENIED**

Many systems use the Support, Denying, Querying, and Commenting (SDQC) labels for classifying replies.

Used in Veracity Prediction



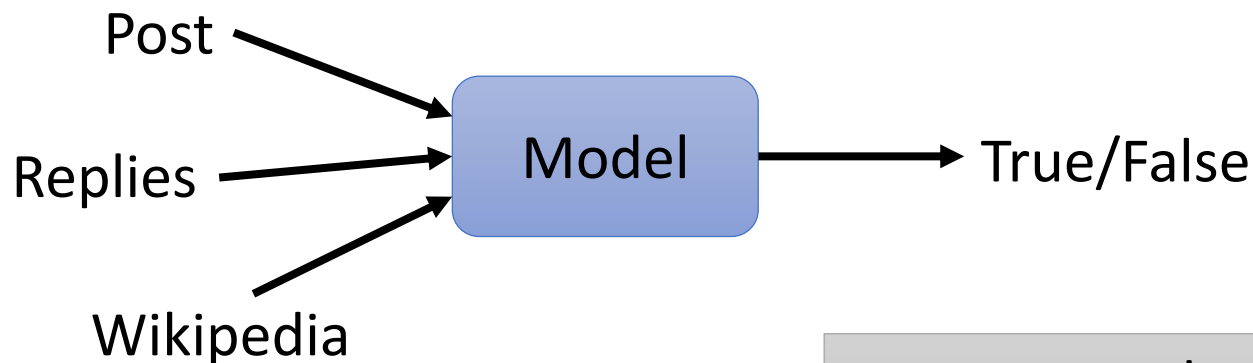
# Veracity Prediction

## Veracity prediction examples:

**u1:** Hostage-taker in supermarket siege killed, reports say. #ParisAttacks –LINK– [true]

**u1:** OMG. #Prince rumoured to be performing in Toronto today. Exciting! [false]

Source of image: <https://www.aclweb.org/anthology/S17-2006.pdf>



Input: several sequences  
Output: class

# Natural Language Inference (NLI)

Input: two sequences

Output: a class

contradiction

entailment

neutral

Model



premise: A person on a horse  
jumps over a broken down airplane

hypothesis: A person is at a diner.

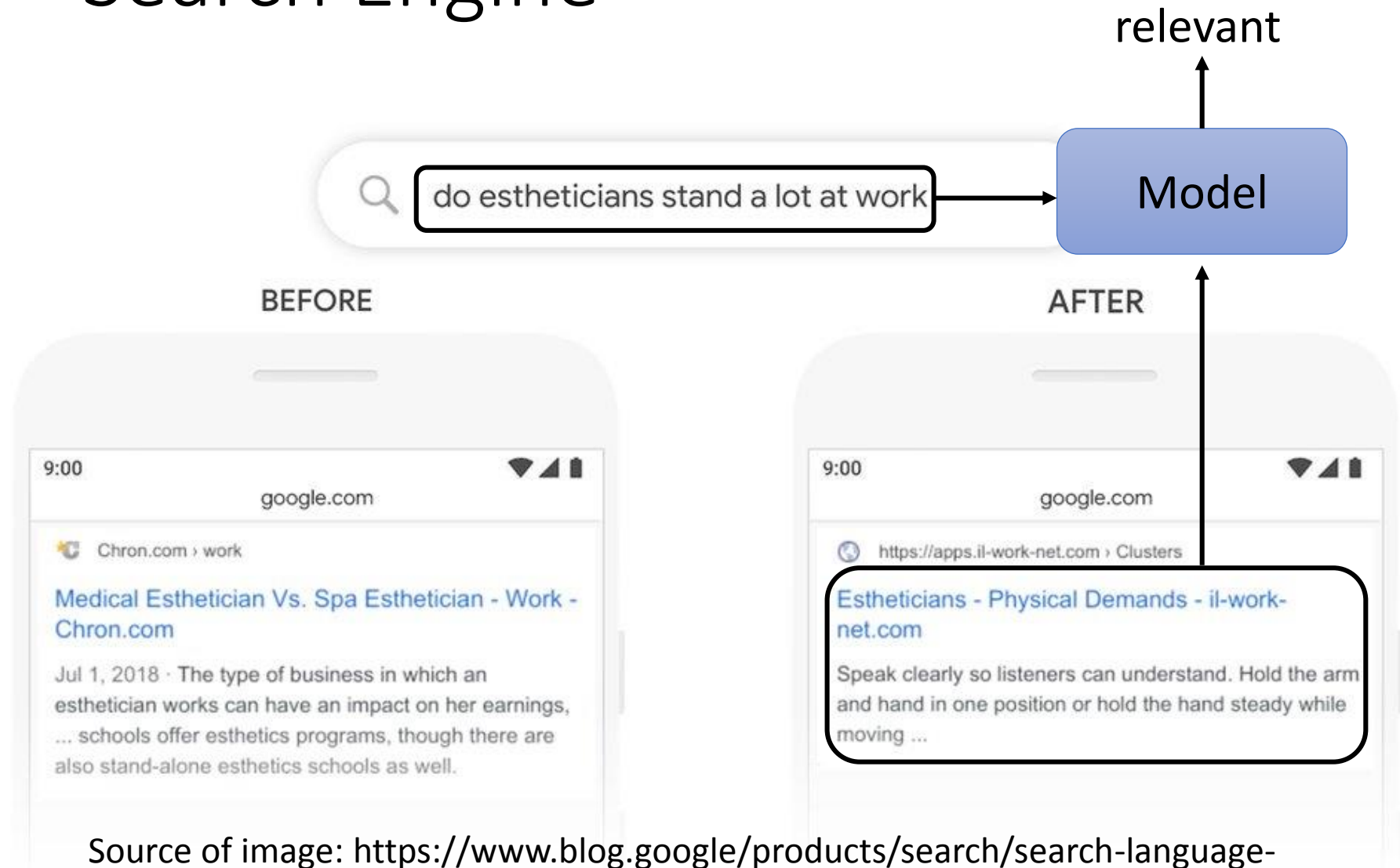
contradiction

hypothesis: A person is outdoors, on a horse. entailment

hypothesis: person is training his horse for a competition. neutral

# Search Engine

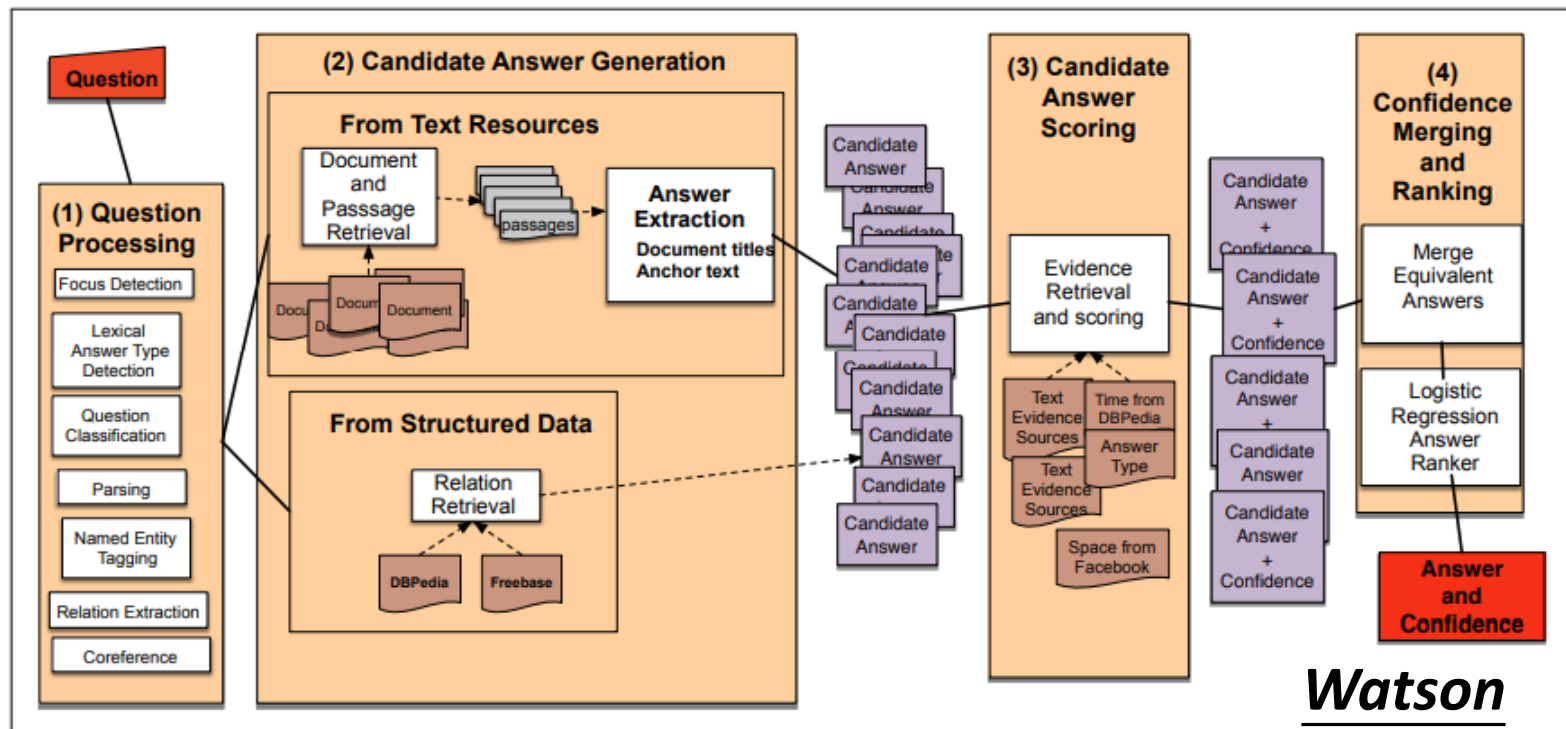
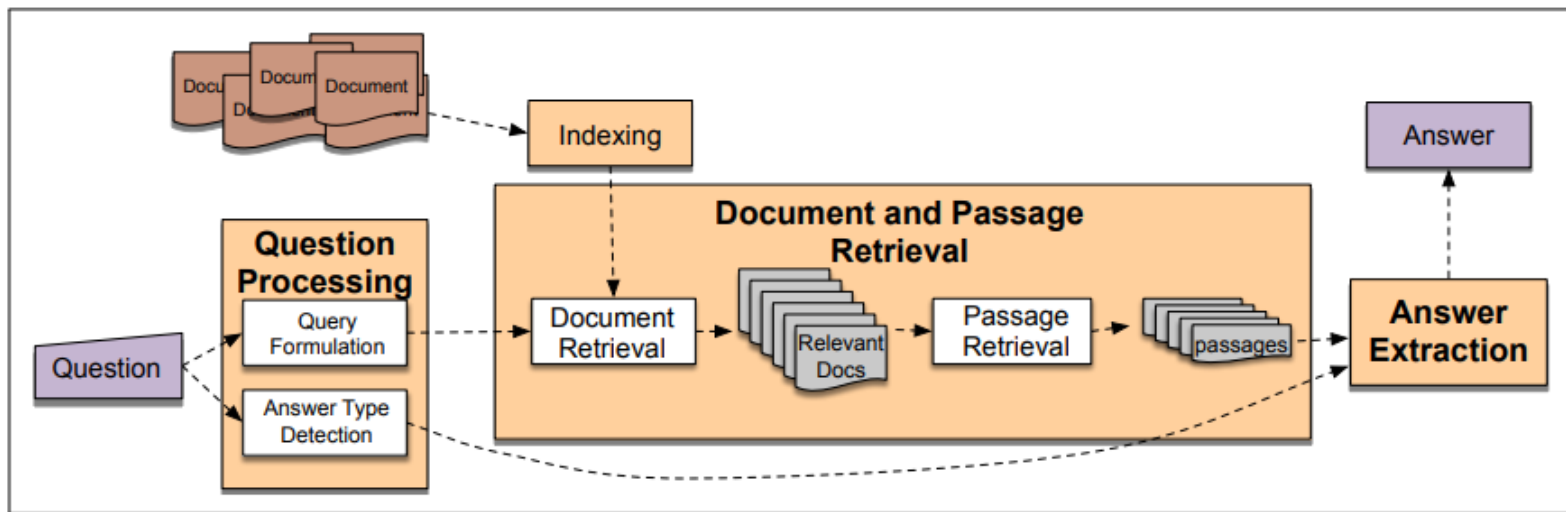
Input: two sequences  
Output: a class



Source of image: <https://www.blog.google/products/search/search-language-understanding-bert/>

# Question Answering (QA)

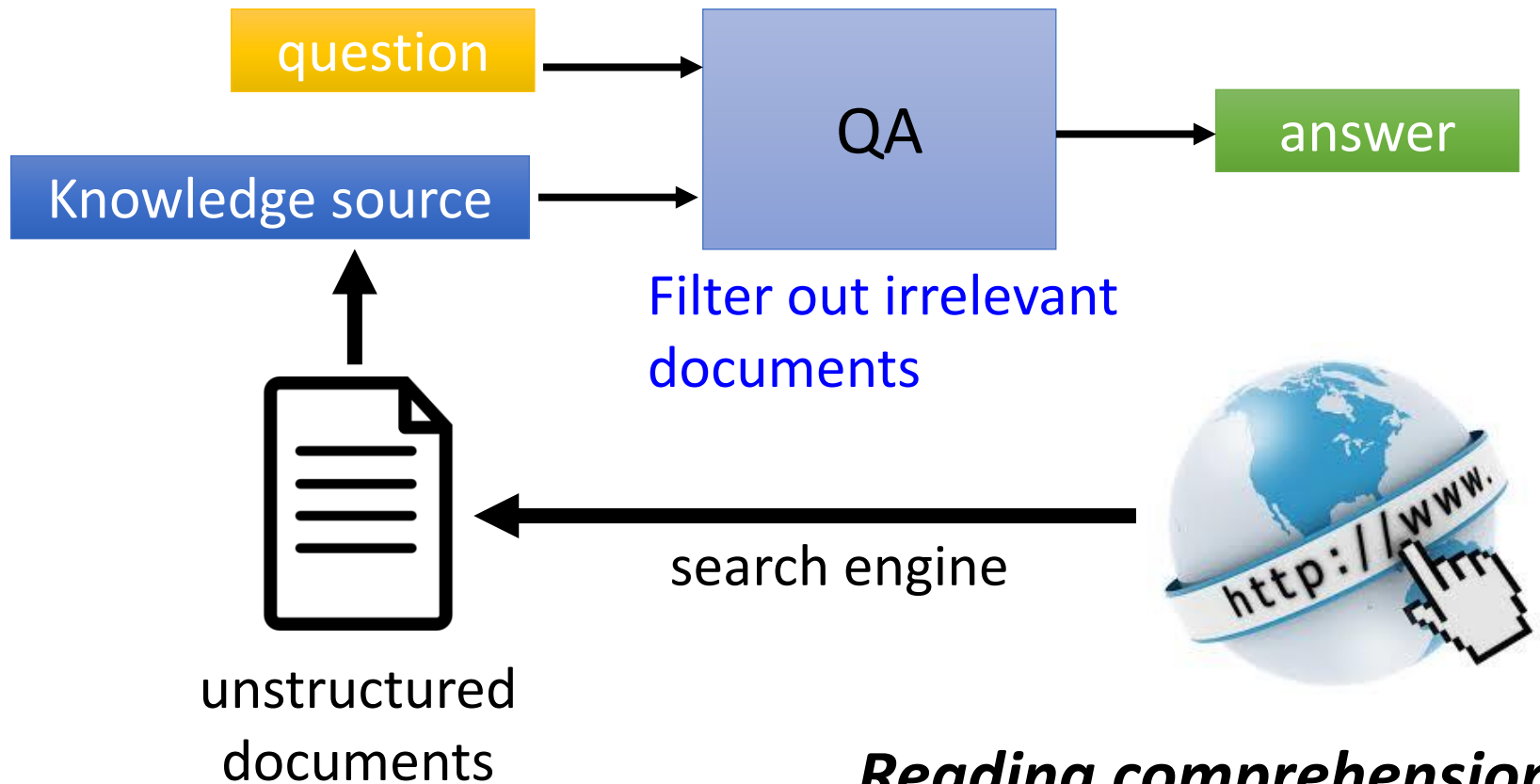




Source of image: <https://web.stanford.edu/~jurafsky/slp3/25.pdf>

# Question Answering

Input: several sequences  
Output: sequence



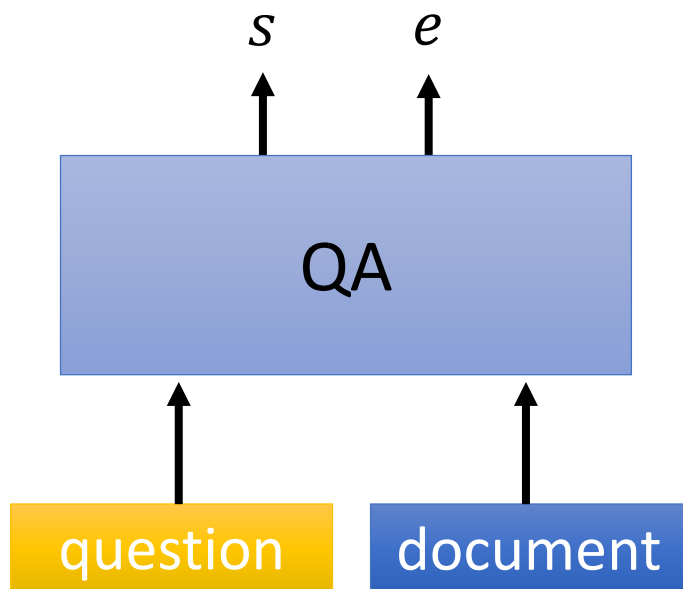
**Reading comprehension**

# Question Answering

Input: several sequences  
Output: sequence

(copy from input)

- Extractive QA: Answer in the document



In meteorology, precipitation is any product of the condensation of 17 spheric water vapor that falls under **gravity**. The main forms of precipitation include drizzle, rain, sleet, snow, **graupel** and hail... Precipitation forms as smaller droplets coalesce via collision with other rain drops or ice crystals **within a cloud**. Short, intense periods of rain 77 at 79 locations are called "showers".

What causes precipitation to fall?

**gravity**

$s = 17, e = 17$

What is another main form of precipitation besides drizzle, rain, snow, sleet and hail?

**graupel**

Where do water droplets collide with ice crystals to form precipitation?

**within a cloud**

$s = 77, e = 79$

# Dialogue

**Chatting**

**Task-oriented**





# Chatting



<https://www.cleverbot.com/>

User: What is your name?

Cleverbot: Weil ich dich nicht kennw.

User: What is your name?

Cleverbot: Li.

User: Are you Li?

Cleverbot: No i'm Mara.

User: Are you Mara?

Cleverbot: No.

User: Who you are?

Cleverbot: I just said your name you don't need to know my name.

User: Do you know my name?

Cleverbot: No that is why I am asking you.

User: Can you tell me your name?

Cleverbot: I already told you.

User: You are Mara?

Cleverbot: I'm sorry.

# Chatting



<https://www.cleverbot.com/>

User: Sorry for what?

Cleverbot: For not remembering your name.

User: Do you remember your name?

Cleverbot: Yes I do...

User: What is your name?

Cleverbot: Once again, I can't tell you.

User: You have told me that you are Mara.

Cleverbot: I am a boy.

User: Are you a boy?

Cleverbot: Yes.

User: Are you a girl?

Cleverbot: No, are you?

User: No. How old are you?

Cleverbot: 2000 years old.

User: You are so old!

Cleverbot: No i'm quite young.

User: How old are you?

Cleverbot: Why do you keep asking me that?

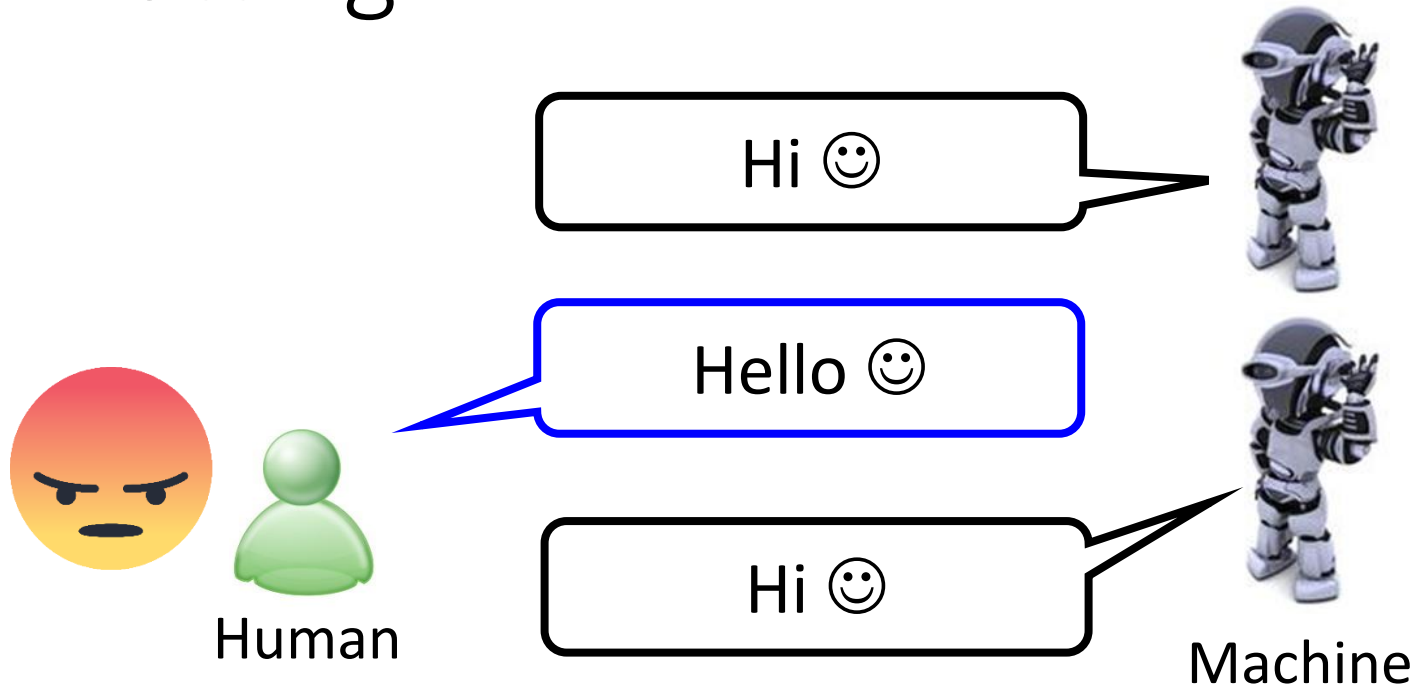
User: Because I want to know your age.

Cleverbot: What if I do not want to tell you.

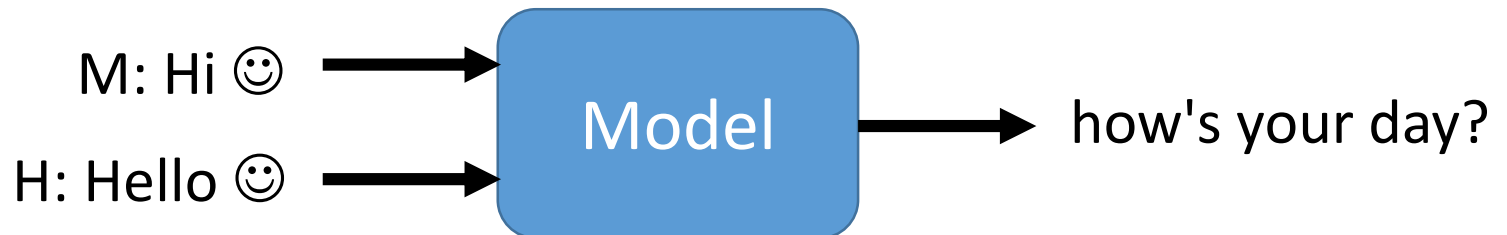
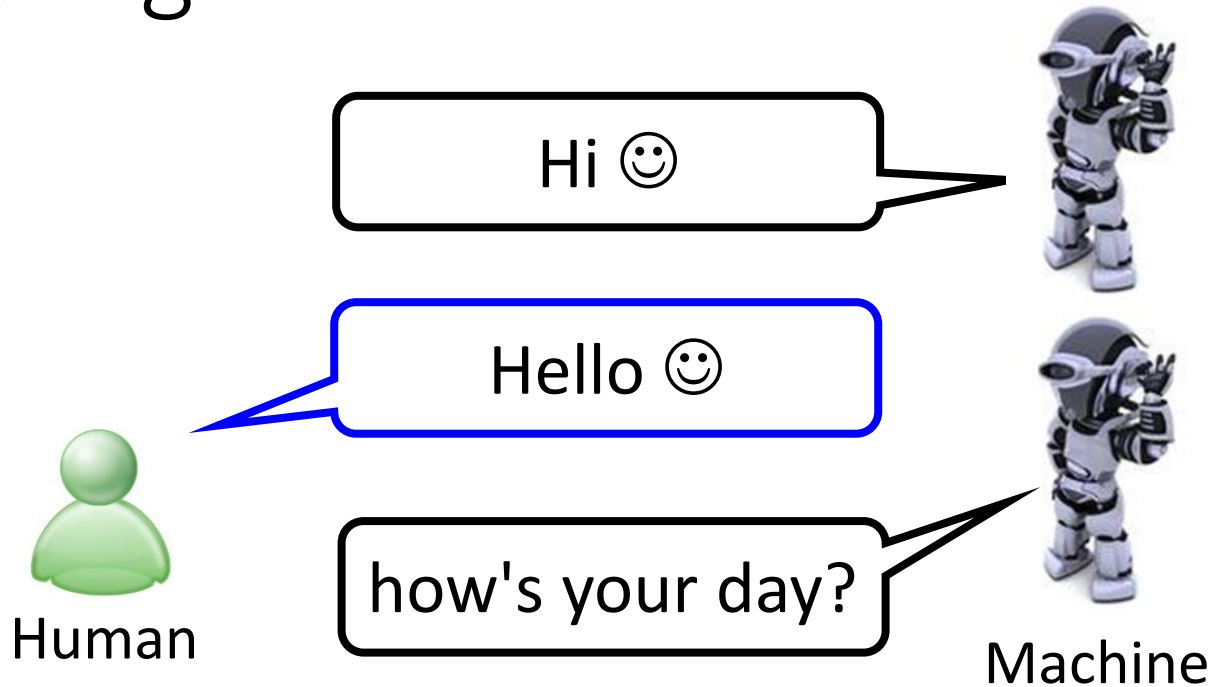
User: Then don't tell me your age.

Cleverbot: My name is Blue Monday.

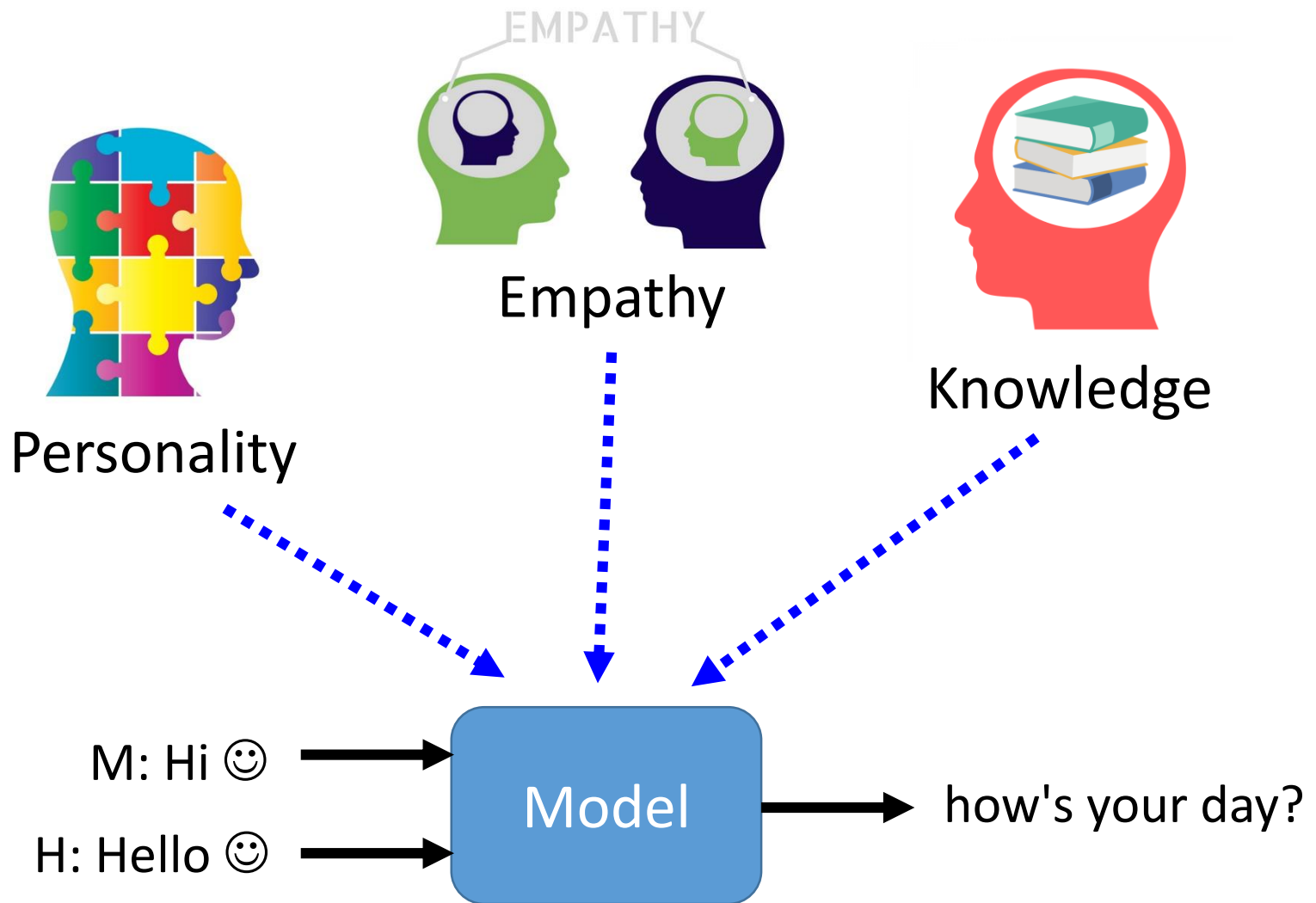
# Chatting



# Chatting



# Chatting

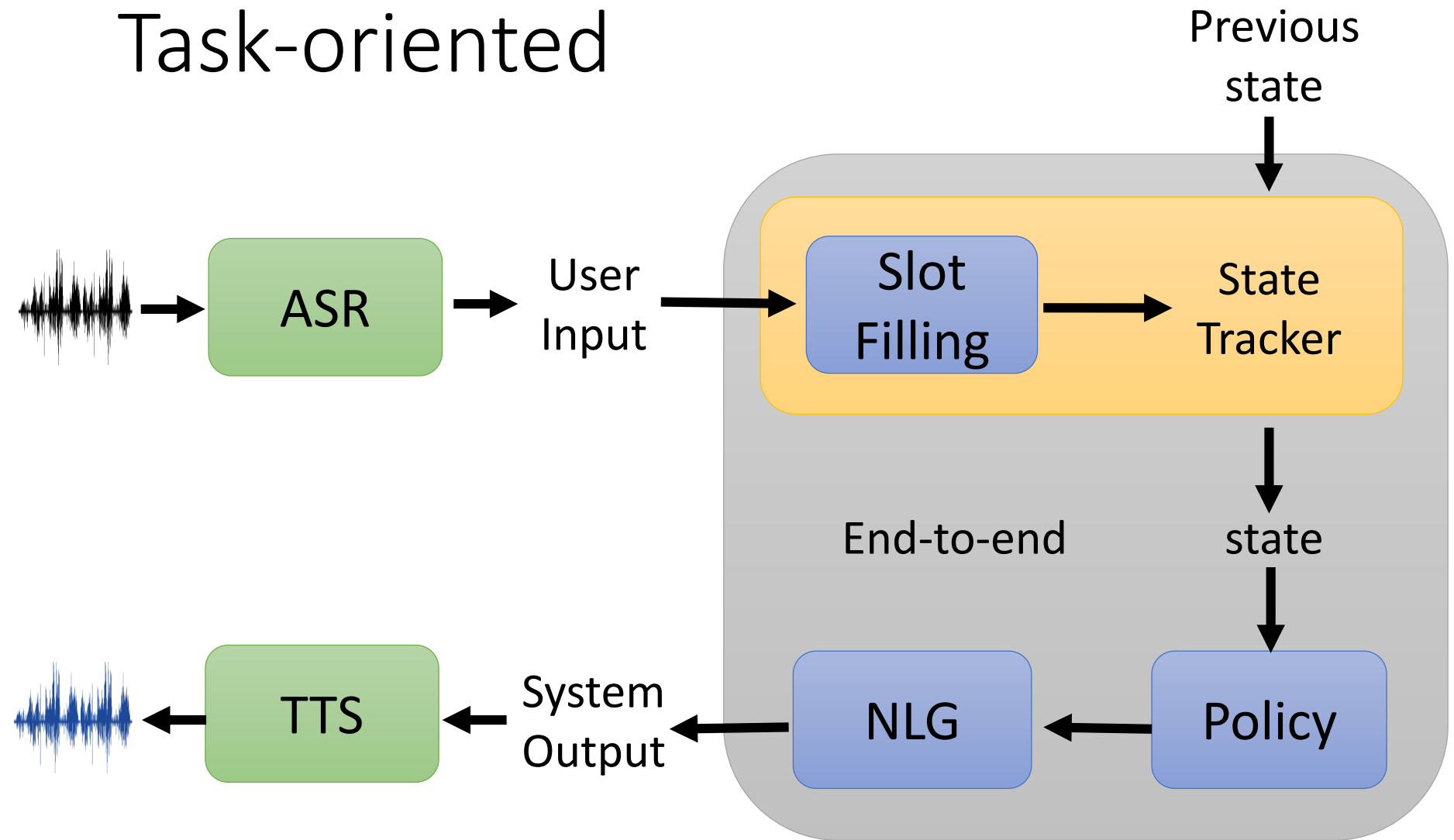


# Task-oriented

1	Agent	您好，這裡是夏季商務旅館，請問有什麼能為您服務的嗎？
2	User	我要訂房
3	Agent	沒問題，請問怎麼稱呼您？
4	User	我姓林
5	Agent	林小姐您好，請問您預計何時入住？
6	User	9月9日晚上入住
7	Agent	請問要住幾個晚上呢？
8	User	2晚
9	Agent	請問訂房人數總共是幾位呢？
10	User	5位
11	Agent	請問您要預定的房型？
12	User	一間豪華套房、一間豪華客房
13	Agent	好的，您入住的日期是9月9日星期一，退房時間為9月11日星期三。請問確認訂房嗎？
14	User	ok

(source of image: 科技大擂台 2020 簡章範例)

# Task-oriented



Input: several sequences, Output: a sequence

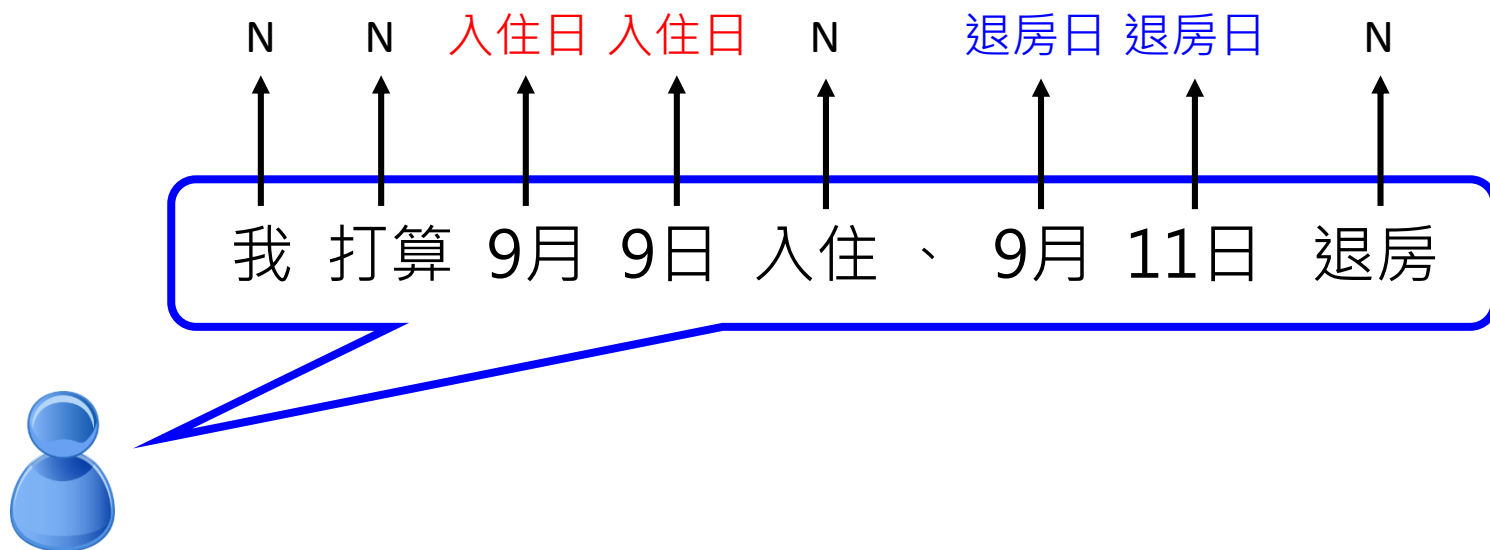
# Slot Filling

Input: a sequence

Output: class for each token in the sequence

連絡人：  
入住人數：  
連絡電話：  
房型：  
入住日期：  
退房日期：

frame





# State Tracker

