

DEEP LEARNING FOR SPEECH AND LANGUAGE

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#DLUPC

Day 2 Lecture 3

Seq2seq Natural Language Processing



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Natural language processing with encoder-decoder

Text summarization

Process of shortening a text document with software to create a summary with the major points of the original document.



Question Answering

Automatically producing an answer to a question given a corresponding document.

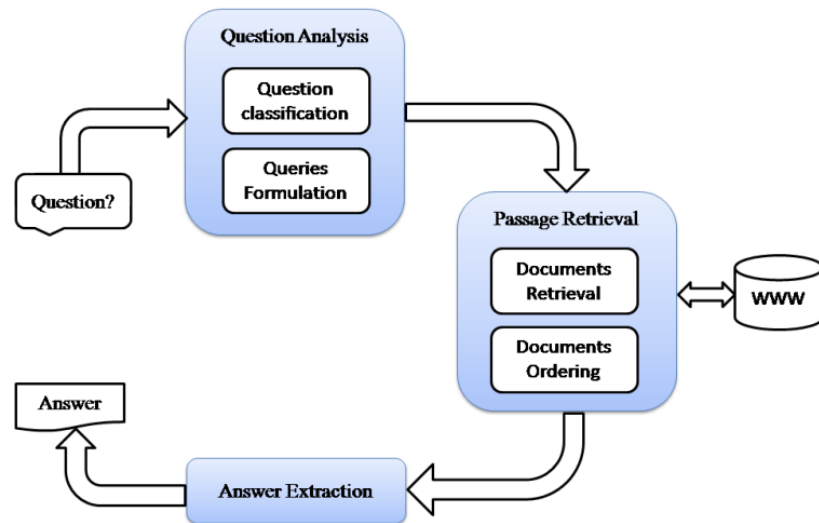


Image src: [Syntactic open domain Arabic question/answering system for factoid](#)

Semantic Parsing

Mapping natural language into a logical form that can be executed on a knowledge base and return an answer

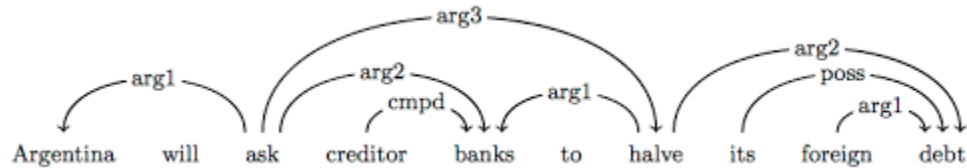


Image src: <http://www.ida.liu.se/~marku61/ceniit.shtml>

Syntactic Parsing

Process of analysing a string of symbols, either in natural language or in computer languages, conforming to the rules of a formal grammar

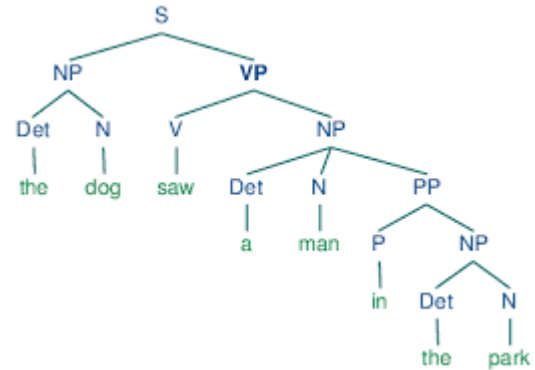


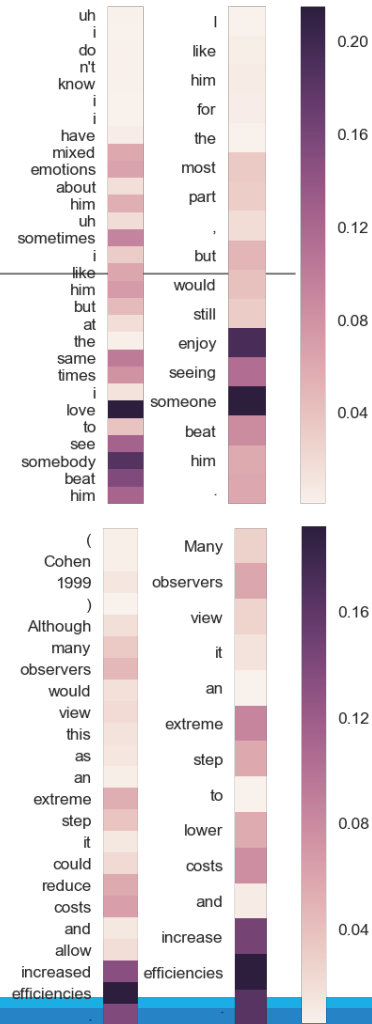
Image Src: http://www.nltk.org/book_1ed/ch08.html

Natural Language Inference

Caption	A person in a black wetsuit is surfing a small wave.
Entailment	A person is surfing a wave.
Contradiction	A woman is trying to sleep on her bed.
Neutral	A person surfing a wave in Hawaii.

Character-level Intra Attention Network for Natural Language Inference

Han Yang and Marta R. Costa-jussà and José A. R. Fonollosa



UseCase: Chatbots

Chatbot: a computer program that conducts a conversation

#	Spkr.	Turn
1	IRIS	Hey, Helen... welcome back! How are you doing?
2	USER	fine and you?
3	IRIS	Is there more?
4	USER	Yes, I finally went to that tennis match I told you the last time.
5	IRIS	The match!
6	USER	Yes, have you seen some sports recently?
7	IRIS	I hate sports.

Chatbots models

RULE-BASED

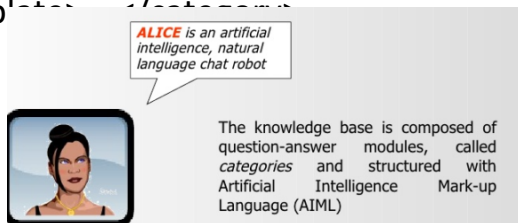
ELIZA: Decomposition rules and key words matching (Weizenbaum, 1966) AIML (Artificial Intelligence Markup Language) (Wallace, 1995).

<category>

<pattern>WHAT IS YOUR NAME</pattern>

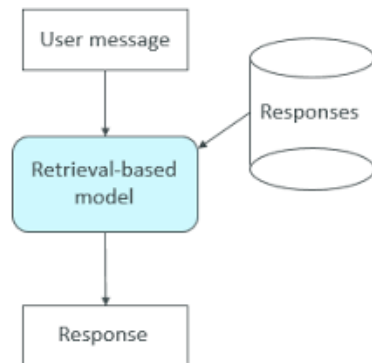
<template>My name is Michael N.S

Evanious.</template>

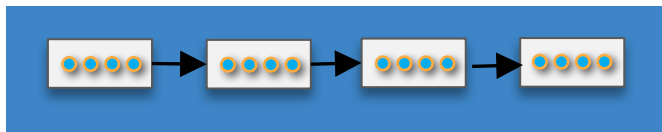


RETRIEVAL-BASED

IRIS: a chat-oriented dialogue system based on the vector space model framework (Banchs and Li, 2012)



Generative-based chatbots



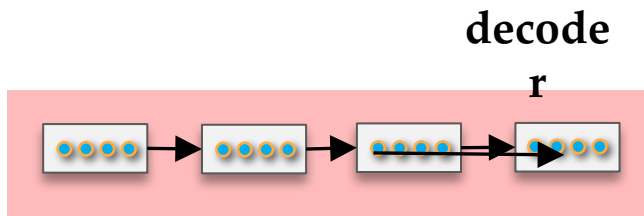
encode
r

Human: what is your job ?

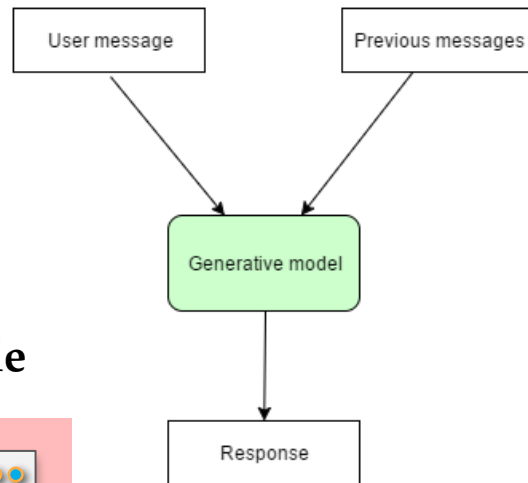
Enc-dec: i'm a lawyer .

Human: what do you do ?

Enc-dec: i'm a doctor .



decode
r



This model can be
trained end-to-end



Can not solve the
problem of modeling
the dialogue

Chatbot evaluation

- ✓ The model can generate simple and basic conversations.
- X The model can not currently deliver realistic conversations.

Question	Count
Enc-dec PREFERRED OVER Cleverbot	97
Cleverbot PREFERRED OVER Enc-dec	60
Tie	20
Disagreeemnt AMONG JUDGES (no consensus of 3 out of 4 judges)	23

A Neural Conversational Model

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Google

Quoc V. Le
Google

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Chatbot examples

Human: what is the purpose of being intelligent ?

CleverBot: The purpose of life is to love God and love people.

Enc-dec: to find out what it is

Human: What do you think about england during the reign of elizabeth ?

CleverBot: I like him. Do you?

Enc-dec: it was a great place .

Human: what is your job ?

CleverBot: I work in mental health

Enc-dec: i 'm a lawyer .

Human: what do you do ?

CleverBot: I have no job .

Enc-dec: i 'm a doctor .

Further improvements

Adding the Attention mechanism

Applying the Transformer

Results

System	Ranking	Evaluator 1	Evaluator 2	Evaluator 3	Agreement
RNN	Good	41	47	54	32
+Attention		61	51	71	43
Transformer		74	57	70	51
RNN	Bad	75	123	53	46
+Attention		90	116	57	46
Transformer		25	110	25	20
RNN	Neutral	84	30	93	15
+Attention		49	33	72	6
Transformer		101	33	105	18

✓ Attention brings
generalization to the
model

Examples

Context How old were you when you were able
to speak ?

RNN Eighteen.

+Attention Seventeen.

Transformer six months.

Context ronald reagan is ...

RNN I'm not a good person.

+Attention And i'm not a spy..

Transformer he's in the hospital.

Context Is five plus five equal to ten ?

RNN No, no.

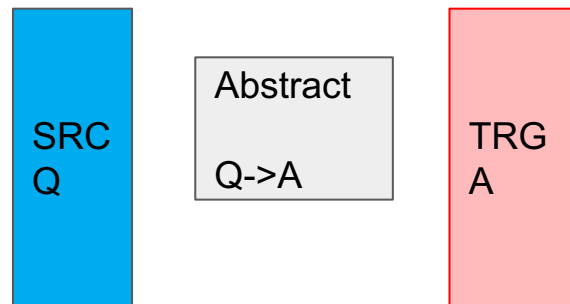
+Attention That's exactly what i'm gon na do.

Transformer yes .

II hackathon tecnologías del lenguaje



Multilingual chatbot



Deep Learning for conversational agents

Next Tuesday 31st at 16:15

More about chatbots...



Thanks ! Q&A ?

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