

Dialogue systems

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- Types of models
- Goal oriented models
- Chit-chat
- Challenges
- Practical case 1: ConvAI
- Practical case 2: building dialogflow

Types of models

- Generative or retrieval
- Long or short conversations
- Open domain or close domain
- Chit-chat or goal oriented

Retrieve answer from predefined dataset.

Pros:

- don't make grammar mistakes
- useful for QA systems
- easy to build and train

Cons:

- cannot handle unseen cases
- cannot produce "unknown behavior"

Generate new responses. Approaches are similar to MT.

Pros:

- works well with unseen cases
- generate interesting responses

Cons:

- hard to train
- complex architectures
- doesn't work when should be precise answer

- Incorporating Context
- Coherent Personality
- Evaluation of Models
- Intention and Diversity

- Linguistic context
- Physical context (user preferences, information outside dialogue)
- Attention with Intention for a Neural Network Conversation Model
<https://arxiv.org/abs/1510.08565>

message Where do you live now?
response I live in Los Angeles.
message In which city do you live now?
response I live in Madrid.
message In which country do you live now?
response England, you?

Рис.: Example of incoherent personality bot

- BLEU
- ranking metrics for retrieval
- classification metrics
- "We show that these metrics correlate very weakly with human judgements in the non-technical Twitter domain, and not at all in the technical Ubuntu domain"<https://arxiv.org/abs/1603.08023>

Dual encoder LSTM

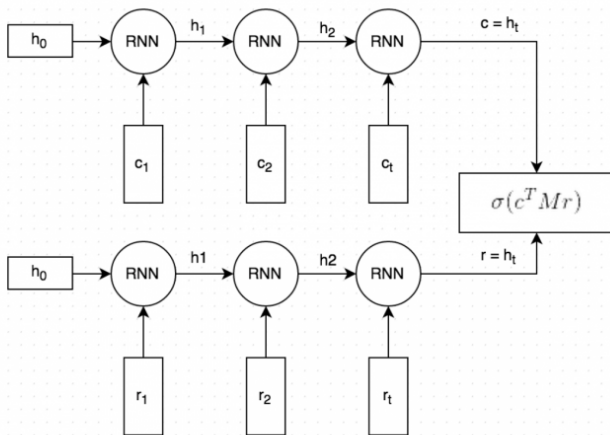


Рис.: Dual encoder RNN

- Embed every word into vector
- Feed vectors for networks simultaneously
- Matrix M is fitted
- Predict actual response as product of M and context
- Loss: cross-entropy

- <https://arxiv.org/abs/1406.1078>
- <https://arxiv.org/abs/1409.3215>
- <https://arxiv.org/abs/1506.05869>

Goal oriented dialogue systems

- Intent Classifier
- Semantic tagger
- Dialogue Manager

- dialogflow
- microsoft bot framework
- ibm watson

<https://docs.google.com/spreadsheets/d/1RgG-dRS42EHIG7QdJOTg2ZO587KutTTPeUfyxVKoIn8/editgid=0>

Practical case 1: ConvAI

- <http://convai.io>
- persona chat dataset
- 1st stage metrics
- 2nd stage human evaluation
- NIPS competition and hackathon

Practical case 1: ConvAI

Persona 1	Persona 2
I like to ski	I am an artist
My wife does not like me anymore	I have four children
I have went to Mexico 4 times this year	I recently got a cat
I hate Mexican food	I enjoy walking for exercise
I like to eat cheetos	I love watching Game of Thrones

[PERSON 1:] Hi
[PERSON 2:] Hello ! How are you today ?
[PERSON 1:] I am good thank you , how are you.
[PERSON 2:] Great, thanks ! My children and I were just about to watch Game of Thrones.
[PERSON 1:] Nice ! How old are your children?
[PERSON 2:] I have four that range in age from 10 to 21. You?
[PERSON 1:] I do not have children at the moment.
[PERSON 2:] That just means you get to keep all the popcorn for yourself.
[PERSON 1:] And Cheetos at the moment!
[PERSON 2:] Good choice. Do you watch Game of Thrones?
[PERSON 1:] No, I do not have much time for TV.
[PERSON 2:] I usually spend my time painting: but, I love the show.

Example dialog from the PERSONA-CHAT dataset. Person 1 is given their own persona (top left) at the beginning of the chat, but does not know the persona of Person 2, and vice-versa. They have to get to know each other during the conversation.

Рис.: Пример из датасета Persona Chat

What we have tried?

- Fine tuning <https://arxiv.org/abs/1801.06146>
- Information retrieval approach

- Build search indexes
- Heuristics in the beginning of the dialogue
- Heuristics to open your personality
- pre-built scenarios
- games with user

Example of a dialogue

ConvAI 7/07/18

Buongiorno! Such a nice day! How are you?
Some facts about me: spiderman is my favorite

Alexander 7/07/18

Hello! I've spend a lot of time in the national park this summer

ConvAI 7/07/18

i have never been . i might be active , but i would rather stay home with my cat .

Alexander 7/07/18

I know this feeling, I would stay and sing country songs

ConvAI 7/07/18

cool . at least you get to work in the daytime , right ? i do a graveyard shift .

Alexander 7/07/18

My favorite band is rascal flats? Do you have favorite band?

ConvAI 7/07/18

i don't have time for bands . i have to be with my friends . how are you doing tonight ?

Alexander 7/07/18

Where have you grow up? I've done that in industry

ConvAI 7/07/18

chicago but we lived in new york for a bit. Also, try to guess: I also love ...

Alexander 7/07/18

To watch movies?

ConvAI 7/07/18

comic books, funny you :)

Рис.: Example of a dialogue

Discussion at the blackboard

QA