A (very) Brief Introduction to Conversational QA

Conversation AI

- Conversational Question Answering
- Task-oriented dialogue agents
- Chatbots(chitchat)

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User: Who is Donald Trump?
System: He is the 45th and current president of the United State.
User: Is he in the running for 2020?
System: Yes, with Mike Pence
User: Who’s gonna run against them.
System: Joe biden
User: okay. Who raise more money in the election?
System: Trump. By July, he raised 1.21 billion.

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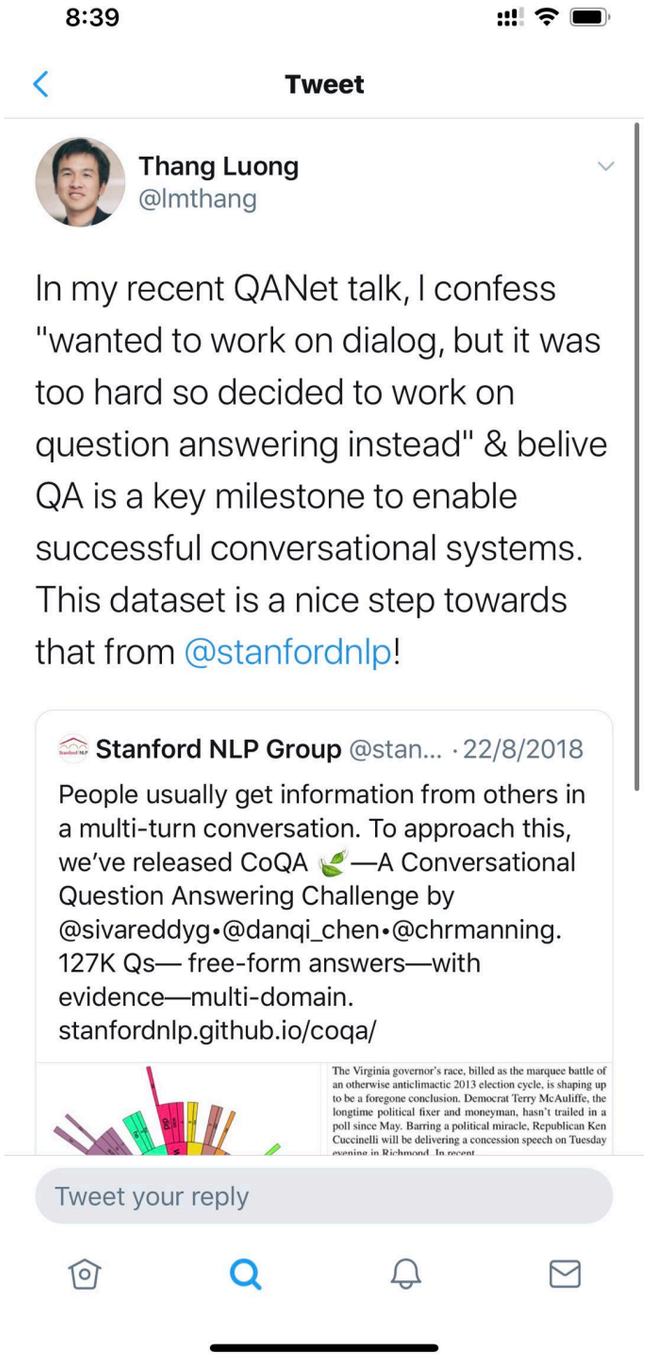

Conversational QA Outline

- Existing Tasks
- Existing Solutions

Conversational QA
Introduction

- Conversation is the natural way for humans to gather information/knowledge.
- Build an intelligent assistant system that can
  - (1) understand conversation context
  - (2) provide correct and informed answers

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Conversational QA

Existing Tasks

Jessica went to sit in her rocking chair. Today was her birthday and she was turning 80. Her granddaughter Annie was coming over in the afternoon and Jessica was very excited to see her. Her daughter Melanie and Melanie's husband Josh were coming as well. Jessica had . . .

Q_1: Who had a birthday?
A_1: Jessica
R_1: Jessica went to sit in her rocking chair. Today was her birthday and she was turning 80.

Q_2: How old would she be?
A_2: 80
R_2: she was turning 80

Q_3: Did she plan to have any visitors?
A_3: Yes
R_3: Her granddaughter Annie was coming over

Q_4: How many?
A_4: Three
R_4: Her granddaughter Annie was coming over in the afternoon and Jessica was very excited to see her. Her daughter Melanie and Melanie's husband Josh were coming as well.

Q_5: Who?
A_5: Annie, Melanie and Josh
R_5: Her granddaughter Annie was coming over in the afternoon and Jessica was very excited to see her. Her daughter Melanie and Melanie's husband Josh were coming as well.

Knowledge Ground (often a passage)

Multi-turn QA (including coreference/topic shift/topic return)

Conversational QA
Existing Tasks

- Conversational Machine Reading Comprehension (CoQA, TACL19)
- Question Answering in Context (QuAC, EMNLP18)
- Open-Retrieval Question Answering in Context (OR-QuAC, SIGIR20)
- Interpretation of Natural Language Rules in Conversational Machine Reading (shARC EMNLP18)

Conversational QA
Existing Tasks

Conversational Machine Reading Comprehension

- In CoQA, a machine has to understand a text passage and answer a series of questions that appear in a conversation.

- The answers can be free-form text, while for each answer, a text span from the passage is regarded as a rationale to the answer.

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Conversational QA
Existing Tasks

(Open-Retrieval) Question Answering in Context

- In QuAC, A students repeatedly ask teachers questions to learn about a topic of interest.

- Students cannot see the passage. Teachers select a text span as the answer and guide the students. (follow up?)

- The OR-QuAC dataset enhances QuAC by adapting it to an open-retrieval setting (do not provide the specific passages but the whole wikipedia).

Section: Daffy Duck, Origin & History

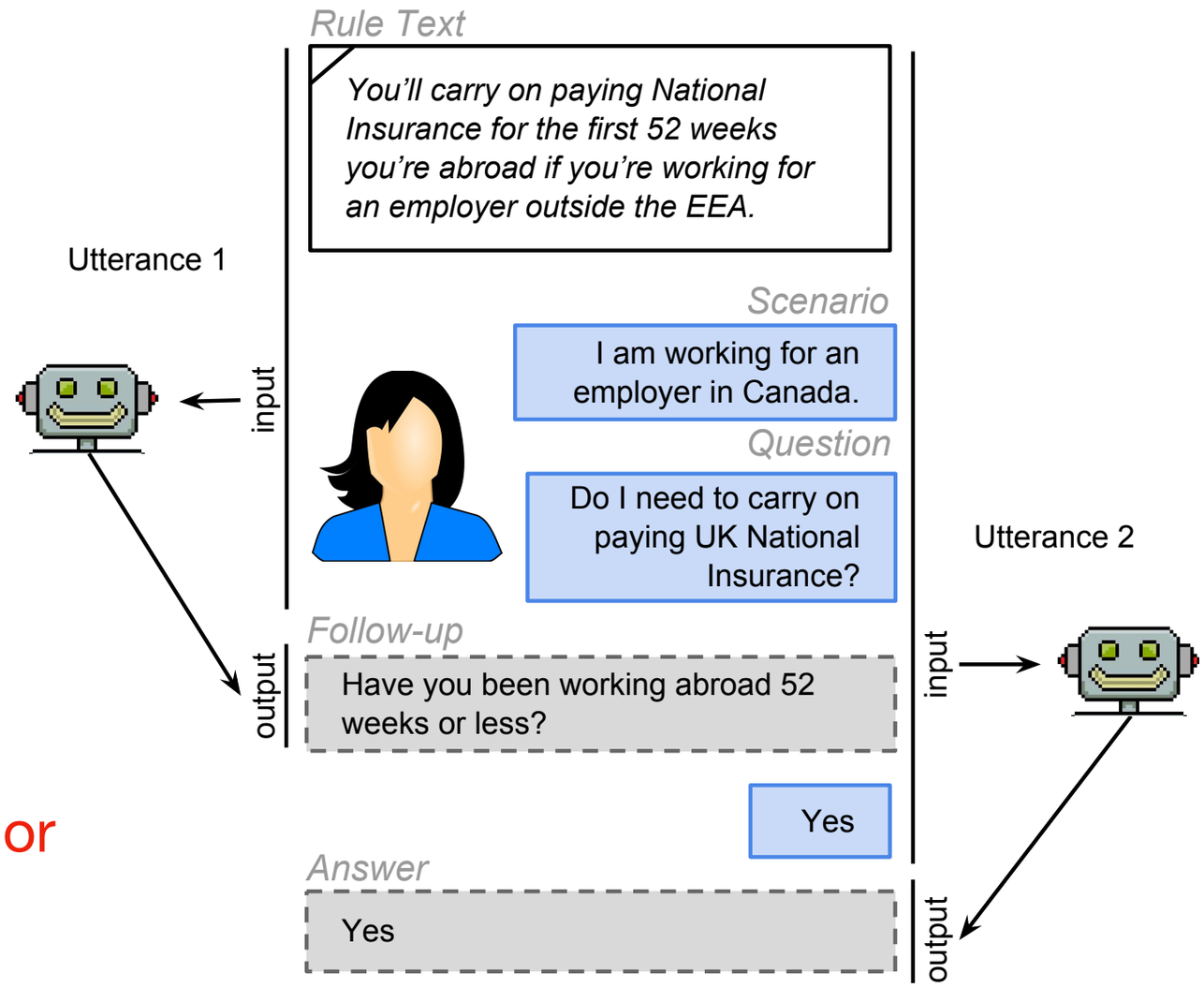
STUDENT: **What is the origin of Daffy Duck?**
TEACHER: ↪ first appeared in Porky's Duck Hunt
STUDENT: **What was he like in that episode?**
TEACHER: ↪ assertive, unrestrained, combative
STUDENT: **Was he the star?**
TEACHER: ↪ No, barely more than an unnamed bit player in this short
STUDENT: **Who was the star?**
TEACHER: ↛ No answer
STUDENT: **Did he change a lot from that first episode in future episodes?**
TEACHER: ↪ Yes, the only aspects of the character that have remained consistent (...) are his voice characterization by Mel Blanc
STUDENT: **How has he changed?**
TEACHER: ↪ Daffy was less anthropomorphic
STUDENT: **In what other ways did he change?**
TEACHER: ↪ Daffy's slobbery, exaggerated lisp (...) is barely noticeable in the early cartoons.
STUDENT: **Why did they add the lisp?**
TEACHER: ↪ One often-repeated "official" story is that it was modeled after producer Leon Schlesinger's tendency to lisp.
STUDENT: **Is there an "unofficial" story?**
TEACHER: ↪ Yes, Mel Blanc (...) contradicts that conventional belief
. . .

Conversational QA

Existing Tasks

Interpretation of Natural Language Rules in Conversational Machine Reading

- Input:
  - a snippet of supporting rule text
  - a context scenario of the question
  - a question
  - a history of previous follow-up questions and answers
- predict the answer to the question (“Yes”or “No”) or, if needed, generate a follow-up question whose answer is necessary to answer the original question.



Solutions

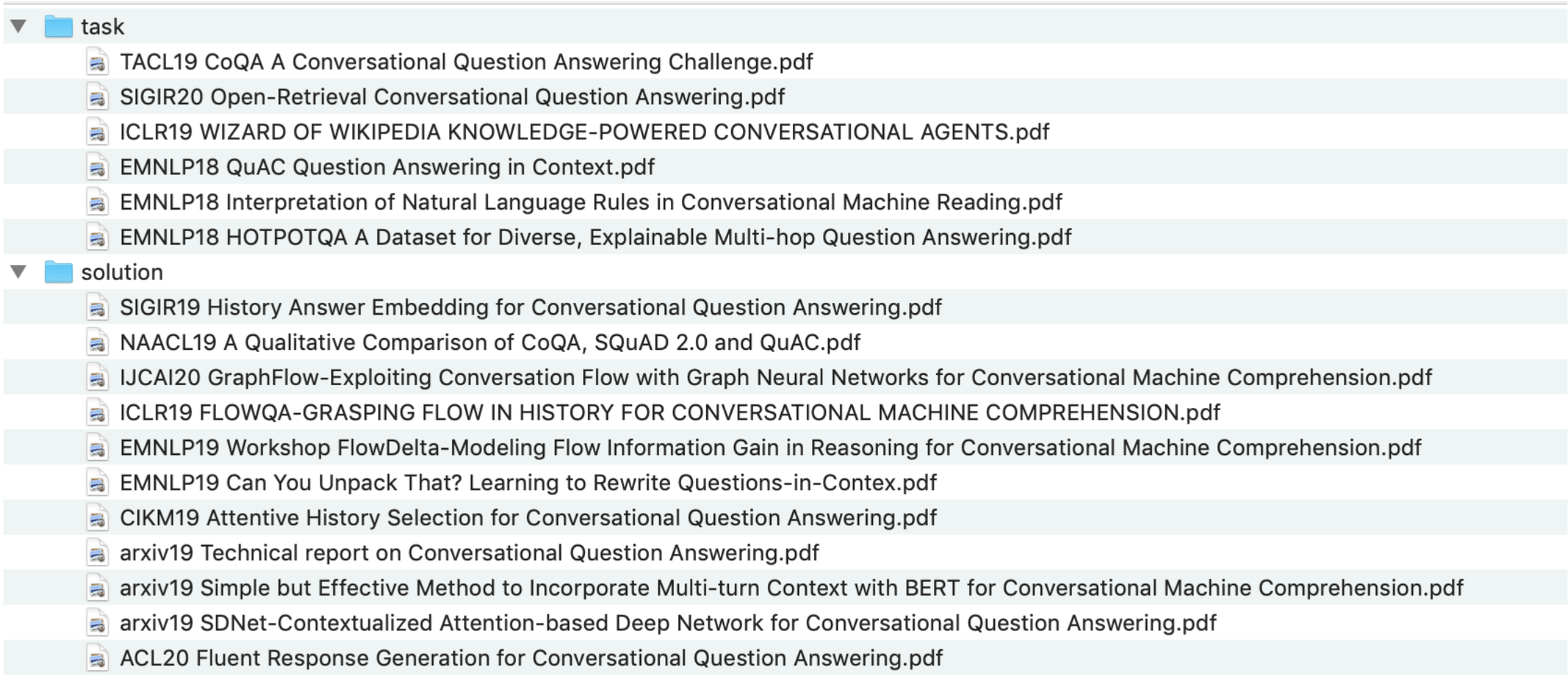
- Augment single-turn QA models with conversation modeling
  - Conversation history selection
    - Latest first? Attention?
  - Conversation history integration
    - Prepending? Attention? Marking previous answers in passage?
- Adapt to single-turn QA models via question rewriting
  - Rewrite a context-dependent question into a self-contained question with the same answer.
  - CANARD—Context Abstraction: Necessary Additional Rewritten Discourse — a new dataset[1] that rewrites QuAC questions.

Solutions

- Disappointingly, the current top-performing models are based on pre-training and other general ML tricks (BERT, knowledge distillation, adversarial training, etc), that are not really tailor-made for conversation and QA.
- Hopefully, there remains substantial room for improvements.

Rank	Model	F1	HEQQ	HEQD
	Human Performance (Choi et al. EMNLP '18)	81.1	100	100
Sep 3, 2020	EL-QA (Single model) *JD AI Research*	**74.6**	**71.6**	**16.3**
2 Jul 29, 2020	HistoryQA (single model) *PAII Inc.*	74.2	71.5	13.9
3 Dec 16, 2019	TR-MT (ensemble) *WeChat AI*	74.4	71.3	13.6
4 Nov 11, 2019	RoBERTa + DA (ensemble) *Microsoft Dynamics 365 AI*	74.0	70.7	13.1

References


task
TACL19 CoQA A Conversational Question Answering Challenge.pdf
SIGIR20 Open-Retrieval Conversational Question Answering.pdf
ICLR19 WIZARD OF WIKIPEDIA KNOWLEDGE-POWERED CONVERSATIONAL AGENTS.pdf
EMNLP18 QuAC Question Answering in Context.pdf
EMNLP18 Interpretation of Natural Language Rules in Conversational Machine Reading.pdf
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ACL20 Fluent Response Generation for Conversational Question Answering.pdf