

AliMe Bot: Knowledge-Based Question Answering, and NLP in Real-world Applications

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Overview

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- KBQA

2 Two Classic NLP Tasks

- Sequence Labelling
- Text Classification

3 Linguists' Role in Real-world NLP

- Data Collection
- Feature Engineering

CV

- 03/2018 - present, Algorithm Engineer, Alibaba Group
- 09/2017 - 01/2018, Research/Teaching Assistant, Tsinghua University
- 09/2016 - 09/2017, MSc in Speech and Language Processing, University of Edinburgh
- 09/2012 - 07/2016, BA in Foreign Languages and Literatures, Tsinghua University

Section 1

AliMe Bot

Chatbot

A **chatbot** is a computer program which conducts conversations with humans.

E.g., Siri by Apple, Alexa by Amazon.



To be more specific: Chit-chat bot, QA bot, Task bot, ...

AliMe Bot: Chatbot for Smart Service

AliMe is a chatbot specialized in the area of smart service. Most of you may have seen it on Taobao, as a customer service coordinator.



But now it is also used in many other areas (e.g., banking, government services, telecommunication).

Knowledge-Based Question Answering

AliMe Bot is actually composed of many tiny chatbots. Different components solve different tasks: some are responsible for **casual chat**, some for **QA**, some for **task-oriented conversations**.

My team builds QA bots. Particularly, we focus on Knowledge-Based Question Answering (**KBQA**).

To answer questions, machines first need to have related knowledge. They can obtain such knowledge by searching the Internet (Web-Based QA), unstructured documents (Document-Based QA), or structured knowledge bases (Knowledge-Based QA).

AliMe-KBQA in 11.11 Global Shopping Festival



Knowledge Base: Nodes and Edges

KB: curated datasets with well defined schema

A simplified Freebase-styled KB consists of:

- Entity (node): objects/values in the real world (e.g., `Beijing, 2018`)
- Predicate (edge): relation between entities (e.g., `TYPE.of`, `is.CAPITAL`)

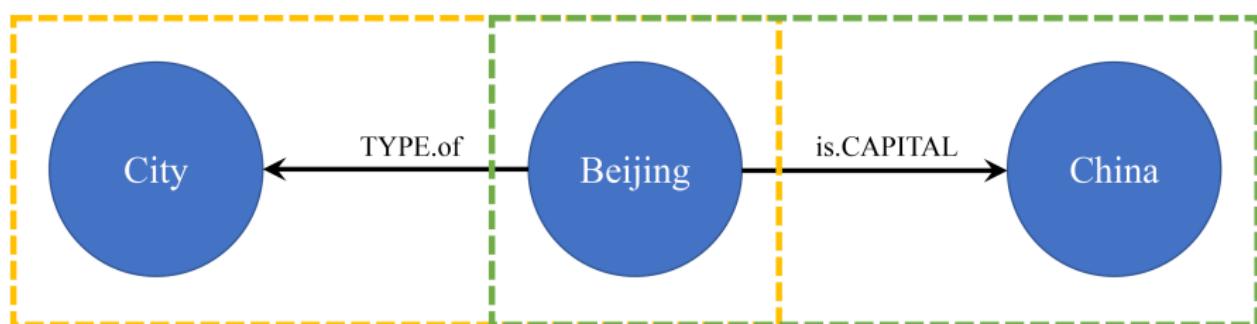
Knowledge Base: Triples

A fact in a KB can be represented by a Triple $\langle e_1, p, e_2 \rangle$.

E.g., $\langle \text{Beijing}, \text{TYPE.of}, \text{City} \rangle$, $\langle \text{Beijing}, \text{is.CAPITAL}, \text{China} \rangle$:

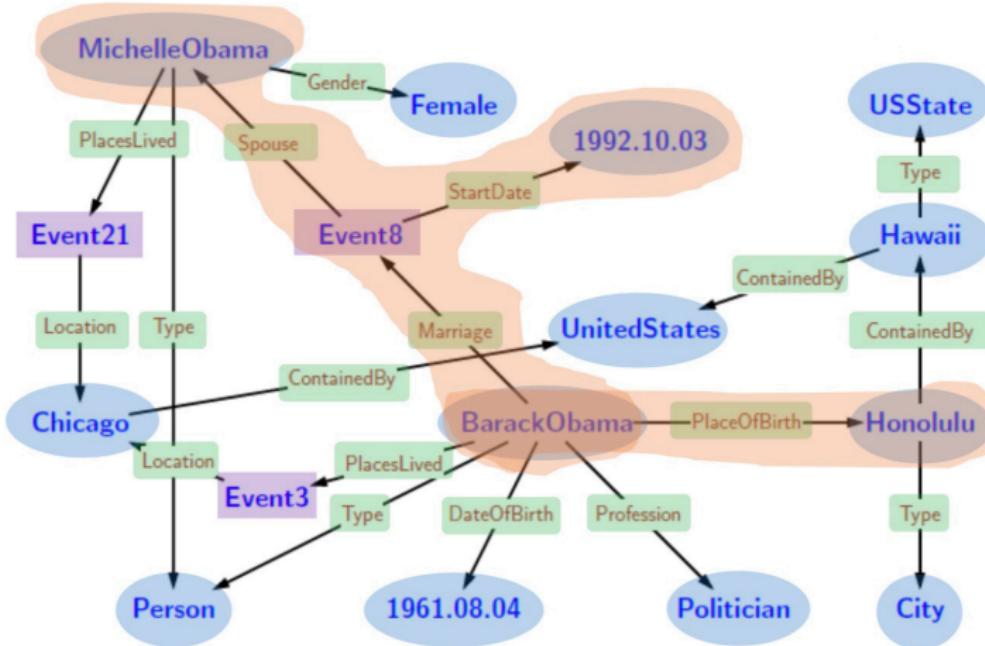
TYPE.of (Beijing, City)

is.CAPITAL (Beijing, China)



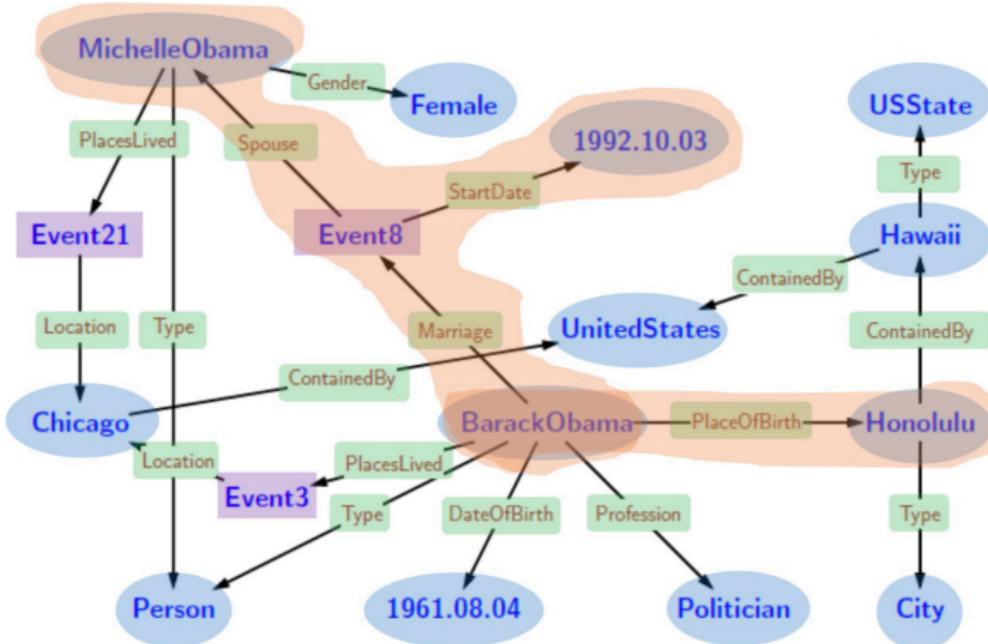
Knowledge Base as a Graph

The whole KB can be viewed as an interlinked graph:



Looking for Answers in a KB

Query: Where was Barack Obama born?

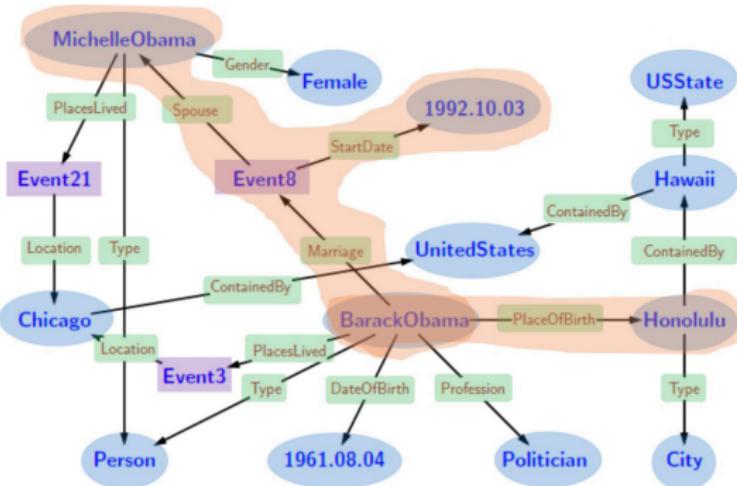


Looking for Answers in a KB

Query: Where was Barack Obama born?

Parsing:

- Entity: Barack Obama
- Predicate: PlaceOfBirth



Section 2

Two Classic NLP Tasks

Sequence Labelling

Input: a sequence of tokens (e.g., words, characters)

Output: a sequence of labels (e.g., POS tags, semantic role labels)

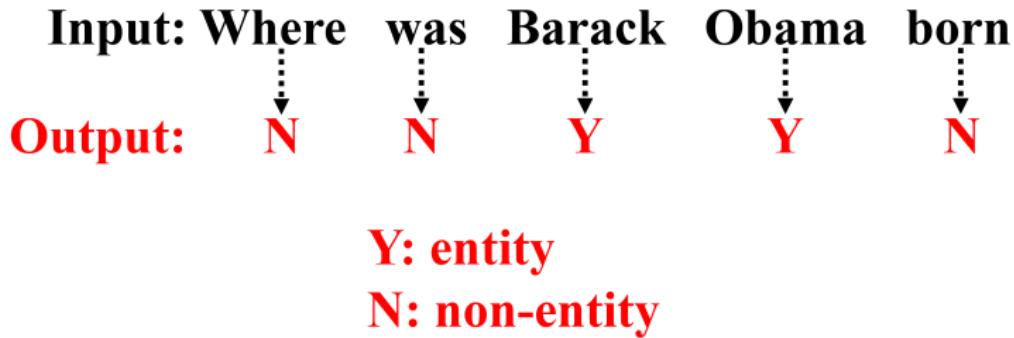
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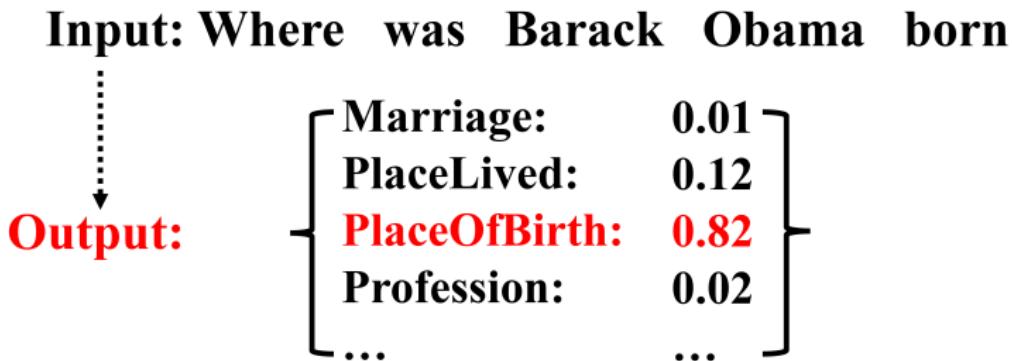


Algorithms: HMM, EM, CRF, Seq2Seq DNN, etc.

Text Classification

Input: a sequence of tokens (e.g., words, characters)

Output: a label (or multi-label) for that sequence (e.g., sentiment categories, news domains)



Algorithms: LR, SVM, GBDT, CNN, RNN, etc.

Section 3

Linguists' Role in Real-world NLP

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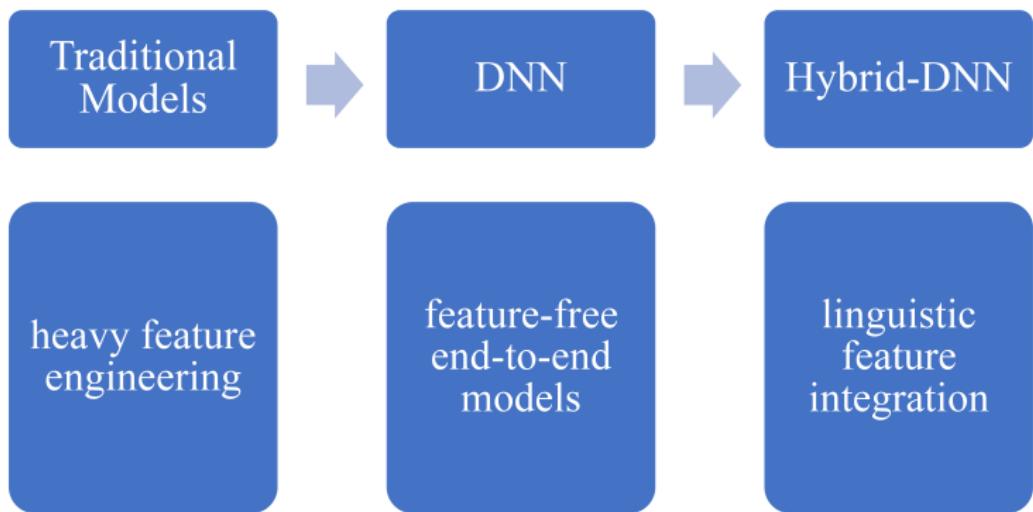
pat1 = r'和 _con| 跟 _con).*_adj'

pat2 = r'更 _adv| 相比 _v| 比 _prep).*_adj'

pat3 = r'_adj.* 还是 _con| 还是 _con.*_adj'

Feature Engineering

Trend of NLP models:



Feature engineering is specially important when data is scarce.

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Some examples: sentiment words, N-grams, negation, figurative expressions, POS tags, WordNet synsets and hypernyms, dependency parsing structures.

We Need Linguists...A Lot of!

- We need linguists who have solid linguistics background.
- If you happen to know coding and some basic NLP knowledge, that's a plus.
- You can even write machine learning models? You are the popular kids.