Q&A for Wikidata

CS294S/W Project Pitch
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Wikidata.org

A large open-domain knowledge base with 90 million items, 8K properties

Q&A on Wikidata

Dataset	Size	Publisher	STOA	Dataset Quality
CSQA	1.6 Million	AAAI 2018	0.71 (F1)	Train & evaluate on synthetic data
LC-Quad 2.0	30K	ISWC 2019	-	Train & evaluate on paraphrase data
KQA Pro	117K	Arxiv 2020	35%	Train & evaluate on paraphrase data
Schema2QA	470K per domain	CIKM 2020	70%	Train on synthetic+paraphrase, evaluate on real questions

Current Status

- Homework: build a Q&A agent for one domain in Wikidata
- Can we extend this to a multi-domain Q&A agent over the entire Wikidata?
  - Extract useful information to generate the manifest and parameter values needed for data synthesis
  - Generate synthetic dataset for all domains
  - Avoid conflicts

Challenges

- Scalability
  - More than 80GB of data
  - Extract useful information to generate the manifest and parameter values needed for data synthesis
  - Generate synthetic dataset for all domains
  - Avoid conflicts
- Representation
  - ThingTalk: qualifiers, joins
- Compositionality
  - Impossible to train on all possible combinations, we need to generalize to unseen programs
  - Can we leverage other information such as types?

Roadmap

1. Download the wikidata dump and extract manifest (1~2 weeks)
2. Build a baseline semantic parser with current infrastructure (1~2 weeks)
3. Find out where it fails
4. Improve the quality of representation (manifest, ThingTalk) & synthetic data (3~4 weeks)
5. Beat the benchmarks and profit!

Auto-IoT
Semantic Parser for IoTs

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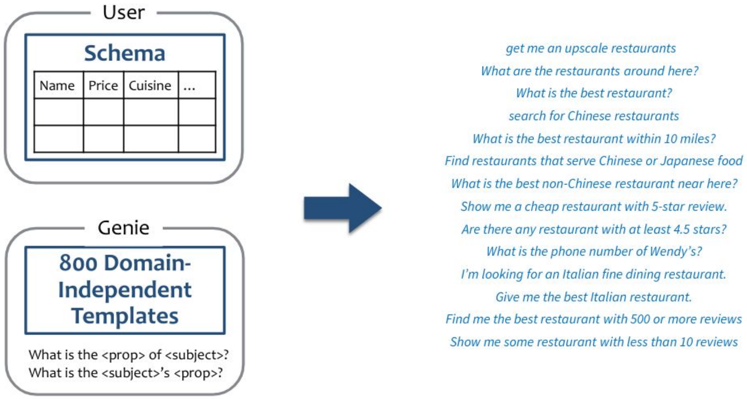
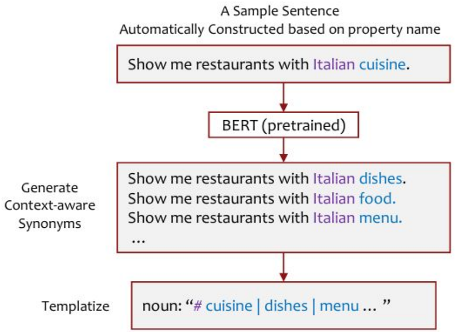
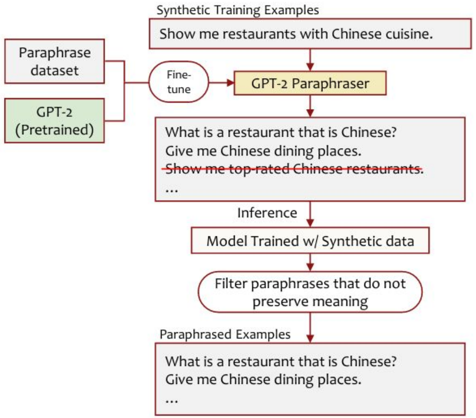
Recap: AutoQA

- Automatically generate Q&A agents from schema
  - Learn how to ask questions using pre-trained language models
  - Synthesize large training set with 800 templates





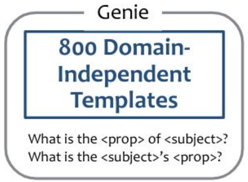


Auto-IoT

Automatically generate virtual assistants to control IoTs from IoT function signatures

IoT function signatures

```
action set_power(in req power: Enum(on,off))
```



Turn on/off the light
Switch on/off the light
Lights up!
Lights out!
...

We have function signatures for 20+ IoT devices in Thingpedia

Difference between Q&A and VA commands

- Generic verb phrases vs domain-specific verb phrases
  - Most of Q&A tables can use generic verb phrase to query: “search”, “find”, “show”, “get”, etc.
  - IoTs have different verb phrases: “turn on/off”, “lower the temperature”, “open the garage door”, “change the color to blue”, etc
- Personalization
  - In Q&A, everyone queries the same database
  - For IoT devices, people may have different set of devices, and may name them differently.

Roadmap

1. Learn available commands for IoTs and analyze their sentence structure (~1 week)
2. Implement a similar algorithm as the one in AutoQA for Auto-IoT (~2 weeks)
3. Find out where it fails
4. Improve the algorithm & investigate new methodologies (3~4 weeks)
5. Get integrated with Almond + Home Assistant
6. Profit!