Error-Aware Interactive Semantic Parsing of OpenStreetMap

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The Task

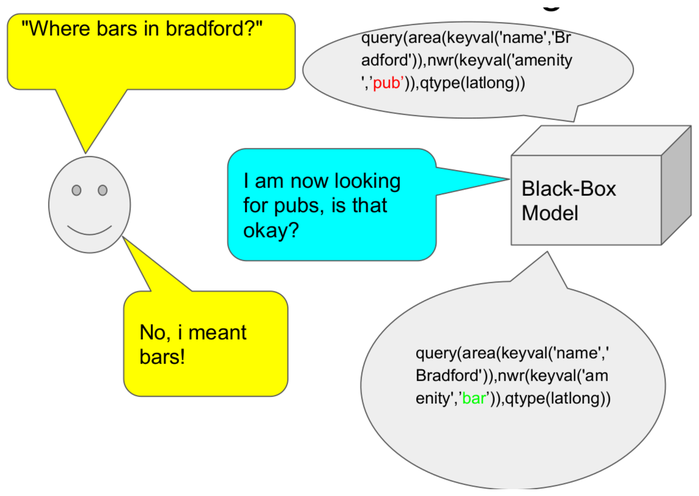

Figure 2: The dataset contains alot of ambiguities. The model is aware of them and can generate alternatives. This allows the model to ask detailed questions regarding the intentions of the user. By taking the user answer into account, a better performance can be reached.

Contribution

- Previous semantic parsing work shows users the parse when requesting feedback.
- Entering a dialogue with a user requires generating natural language questions, which needs costly annotations.
- Entropy-based uncertainty analysis is used to create questions without annotations.
- Human users then answer these questions.
- During training and evaluation, gold parse information simulates human answers.
- The newly generated information is inputted into a multi-source model.
- Simulated performance increases by 1.2% F1 over a baseline achieving 90.26% F1.
- Annotations are used for validation.

Ambiguities

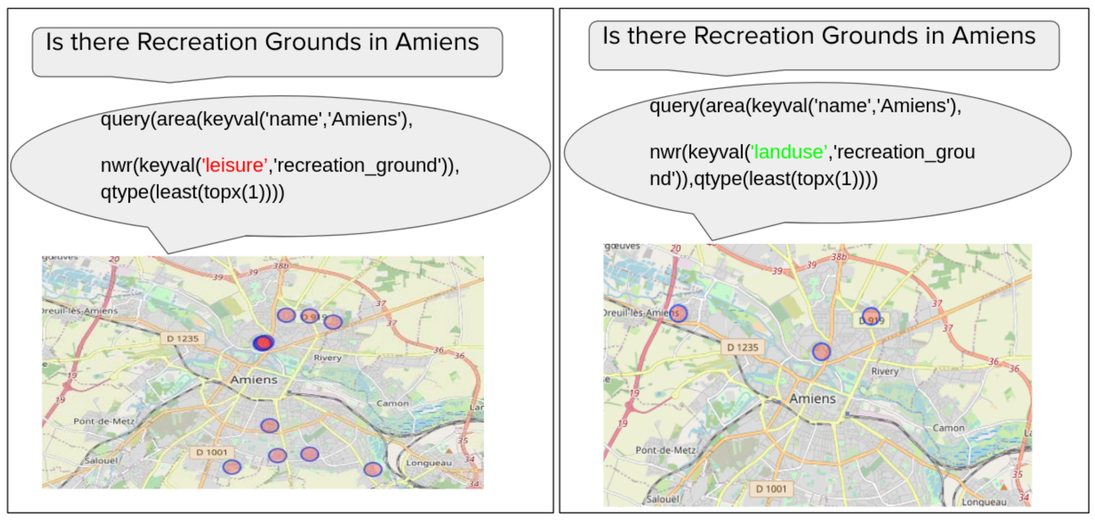

Figure 1: Many questions in the dataset or entities in OpenStreetMap are ambigious.

Interaction Process

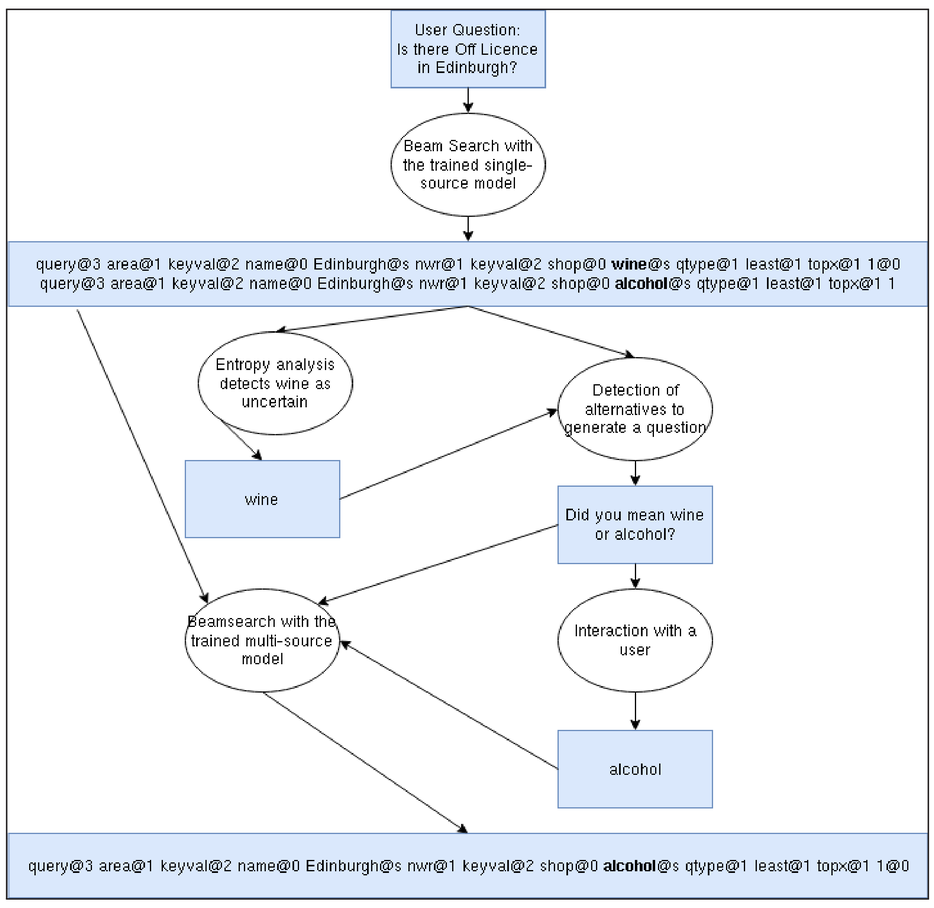

Figure 3: Based on the confidence of the model alternatives are looked up in the different beams. A question based on this alternative is asked, and the user has to answer the question. The dialogue is then taken into account in a multi-source model to generate a better hypothesis.

Annotation Setup

Result of the query:
Question #0: closest Off License from Lyon

query@2 around@4 center@1 nwr@1 keyval@2 name@0 Lyon@s search@1 nwr@1 keyval@2 shop@0 wine@s maxdist@1 DIST_INTOWN@0 topx@1 1@0 qtype@1 latlong@0

		Is the Information correct? [Mark the errors]
Reference Point	**name : Lyon**	Yes / No
POI(s)	**shop : wine**	Yes / No
Question Type	**Where**	Yes / No
Proximity	**Around/Near**	Yes / No
Restriction	**Closest POI only**	Yes / No

Enter a clarification Dialogue (either answer the question or replace it with a better one) [Natural Language Postedit]:
Did you mean wine or alcohol? alcohol

Figure 4: Annotation setup for human interaction study.

Results

System	F1
Lawrence (2018)	80.36
Lawrence (2018)+NER	90.09
token-based	83.43
character-based	93.77

Table 1: F1 results of single-source models on the original NLmaps v2 dataset.

System	Accuracy	F1
baseline	83.50	90.26
+ hyps	83.66	90.85
+ dia	84.74	92.02
+ hyps + dia	84.84	91.47
+ hyps + dia + log	85.01	91.61

Table 2: Results of the multi-source models compared to the single-source model taking only the source into account on the modified test data.

Conclusion

- Different developer and user tagging preferences cause ambiguities and errors in OSM parsing.
- This is solved by interactive parsing, where the parser receives human feedback
- Human users find errors can provide corrections
- This work is a step towards precise communication and offline learning in interactive semantic parsing.
- Future work includes online learning for interactive semantic parsing

Contact

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- Comments, suggestions and collaborations welcome!