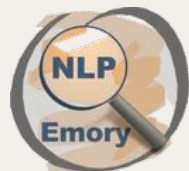


Dialogue State Generation: Transcending Slot Schemas for Domain-General State Inference

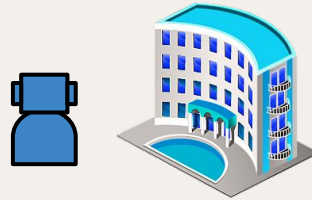
James D. Finch, Boxin Zhao, Jinho D. Choi

Emory University



Emory NLP
Research Lab

Dialogue State Tracking (DST)



no. of days

area

internet

stars

no. of people

Dialogue State Tracking (DST)



Hi there, I'd like to book a hotel room for four nights.



no. of days

4

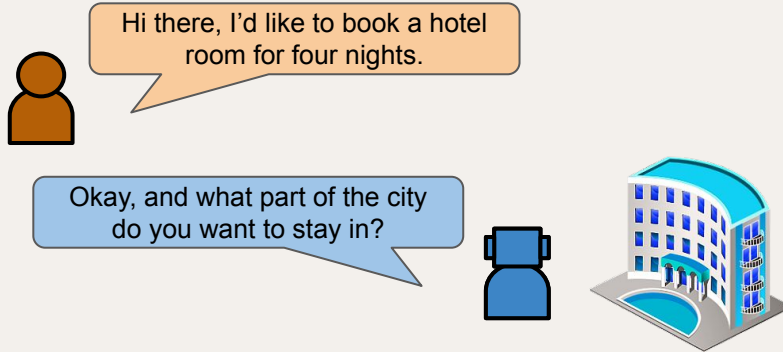
area

internet

stars

no. of people

Dialogue State Tracking (DST)



no. of days

4

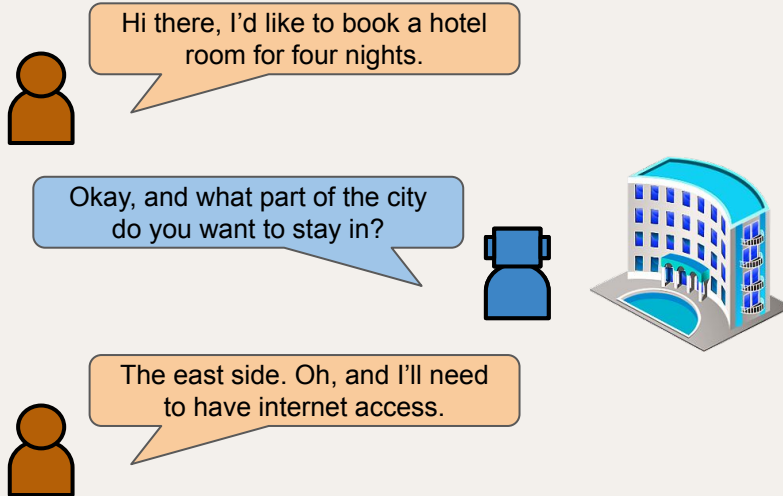
area

internet

stars

no. of people

Dialogue State Tracking (DST)



no. of days

4

area

east

internet

yes

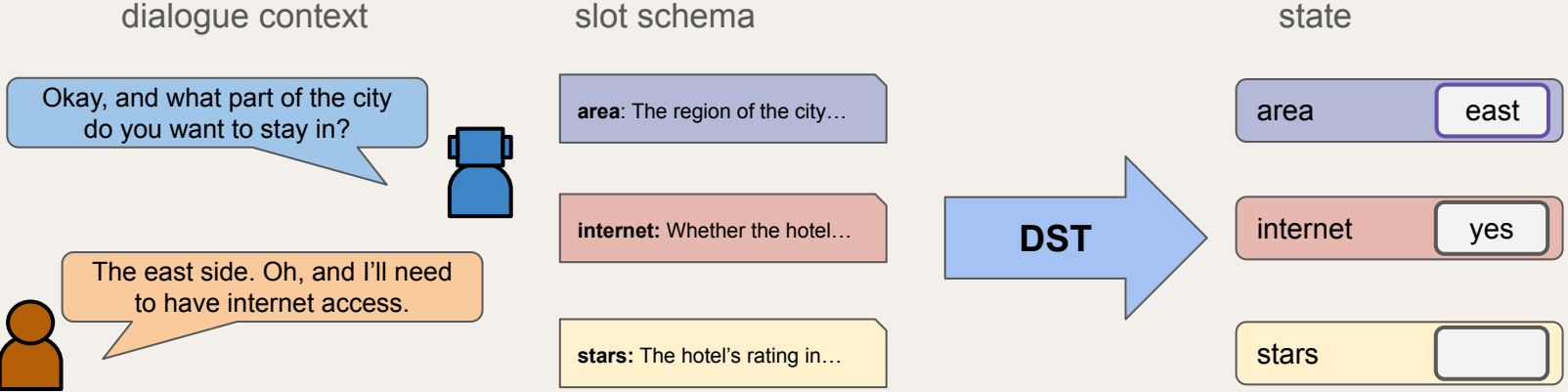
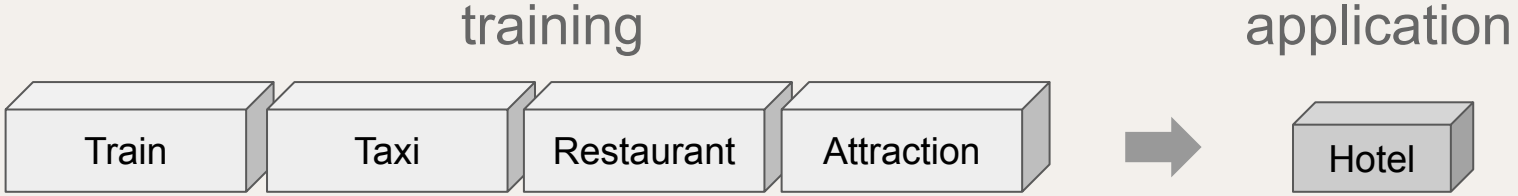
stars

no. of people

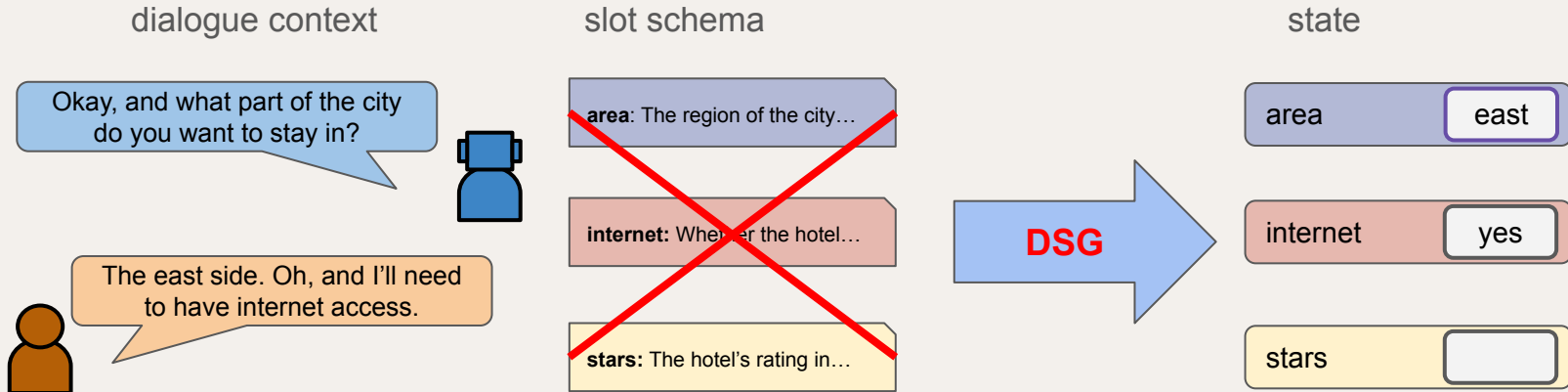
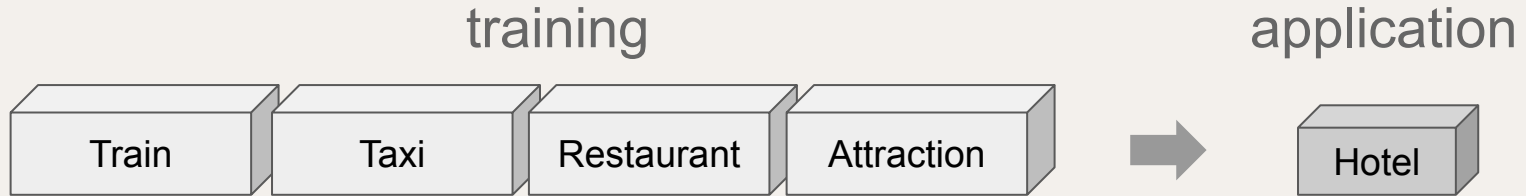
Dialogue State Tracking (DST)



Dialogue State Tracking (DST)



Dialogue State Generation



GPTPipe: DSG with LLMs

Dialogue Context

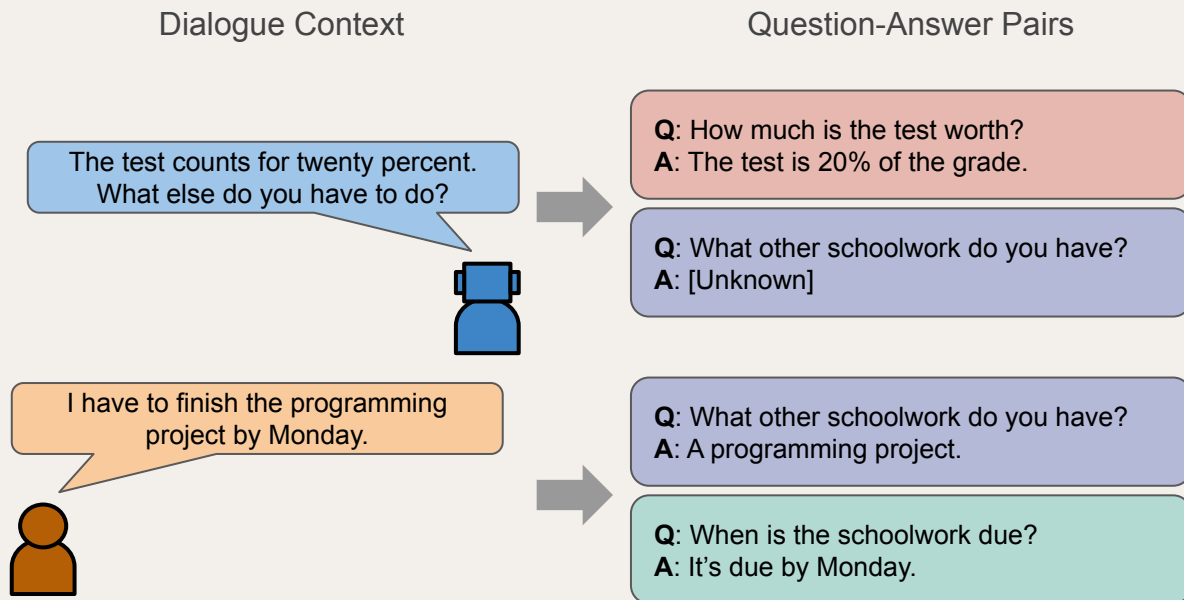
The test counts for twenty percent.
What else do you have to do?



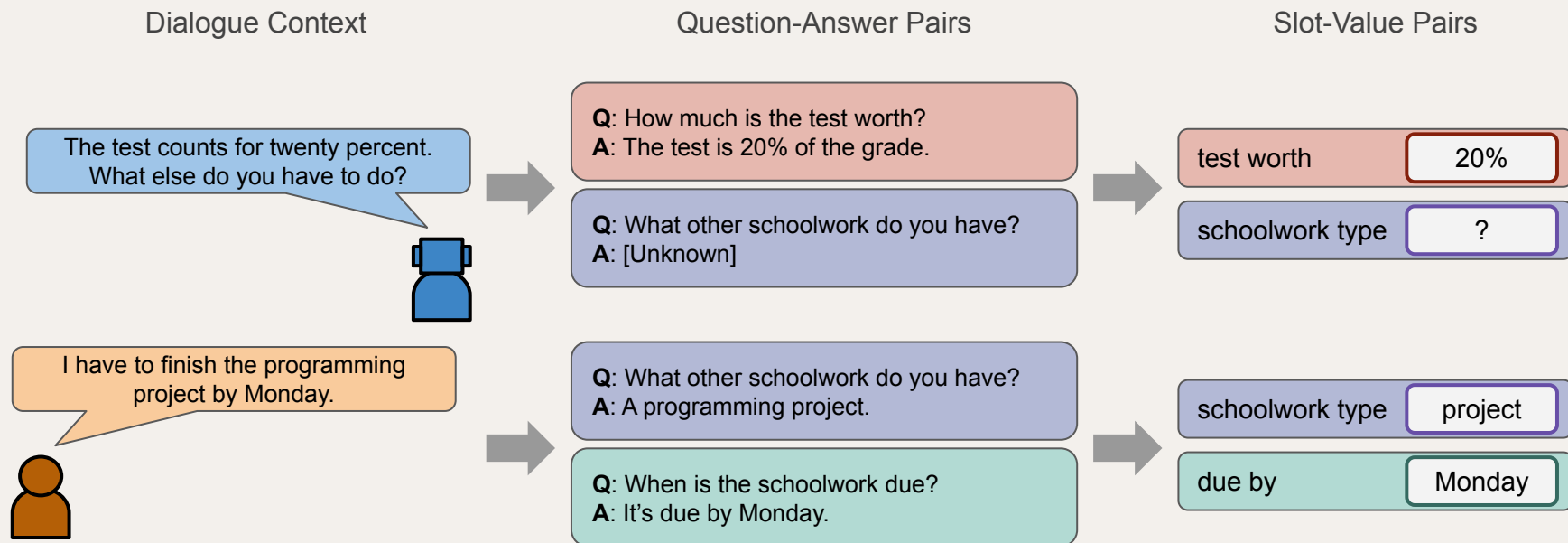
I have to finish the programming
project by Monday.



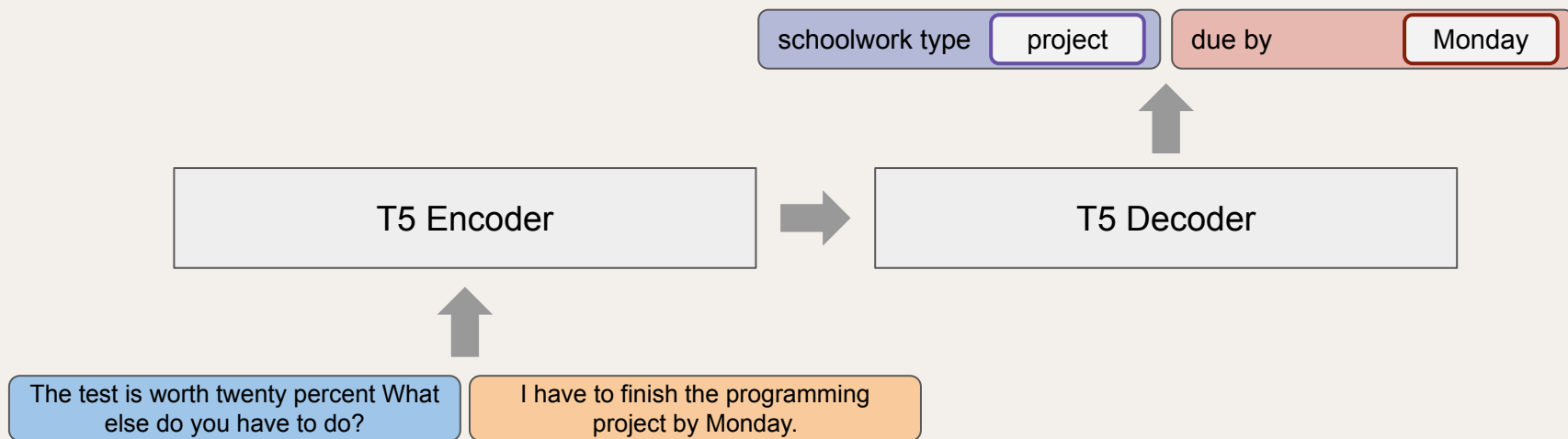
GPTPipe: DSG with LLMs



GPTPipe: DSG with LLMs



End-to-End Model



Limitation: Low Diversity in Training Resources

	Domains	Slot Types	Dialogues
MultiWOZ	5	31	8,438
Schema Guided Dialogues	16	214	16,142

Rastogi, Abhinav, Xiaoxue Zang, Srinivas Sunkara, Raghav Gupta, and Pranav Khaitan. 2020. "Towards Scalable Multi-Domain Conversational Agents: The Schema-Guided Dialogue Dataset." *Proceedings of the AAAI Conference on Artificial Intelligence* 34 (05): 8689-96.

<https://doi.org/10.1609/aaai.v34i05.8334>

Budzianowski, Paweł, Tsung-Hsien Wen, Bo-Hsiang Tseng, Iligo Casanueva, Stefan Ultes, Osman Ramadan, and Milica Gašić. 2018. "MultiWOZ - A Large-Scale Multi-Domain Wizard-of-Oz Dataset for Task-Oriented Dialogue Modelling." In *Proceedings of the 2018 Conference on Empirical Methods in Natural Language Processing*, 5016-26. Brussels, Belgium: Association for Computational Linguistics. <https://doi.org/10.18653/v1/D18-1547>.

DSG5K: Domain-Diverse Dialogue Dataset

Scenarios

“Please list everyday scenarios...”



A student talks to an academic advisor for advice on improving their grades.

Musician talks to manager in order to schedule a performance.

Librarian talks to colleague in order to recommend a book.

DSG5K: Domain-Diverse Dialogue Dataset

Scenarios

"Please list everyday scenarios..."



- A student talks to an academic advisor for advice on improving their grades.
- Musician talks to manager in order to schedule a performance.
- Librarian talks to colleague in order to recommend a book.



Dialogue

The test is worth twenty percent.
What else do you have to do?



I have to finish the programming project by Monday.



Limitation: Low Diversity in Training Resources

	Domains	Slot Types	Dialogues
MultiWOZ	5	31	8,438
Schema Guided Dialogues	16	214	16,142
<u>DSG5K</u>	1,003	173,572*	5,015

Rastogi, Abhinav, Xiaoxue Zang, Srinivas Sunkara, Raghav Gupta, and Pranav Khaitan. 2020. "Towards Scalable Multi-Domain Conversational Agents: The Schema-Guided Dialogue Dataset." *Proceedings of the AAAI Conference on Artificial Intelligence* 34 (05): 8689-96.

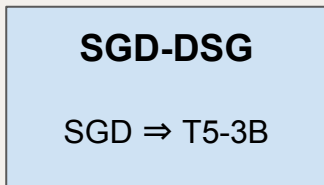
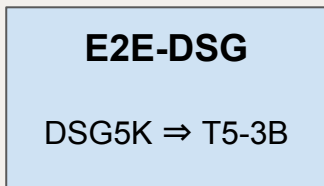
<https://doi.org/10.1609/aaai.v34i05.8334>

Budzianowski, Paweł, Tsung-Hsien Wen, Bo-Hsiang Tseng, Iligo Casanueva, Stefan Ultes, Osman Ramadan, and Milica Gašić. 2018. "MultiWOZ - A Large-Scale Multi-Domain Wizard-of-Oz Dataset for Task-Oriented Dialogue Modelling." In *Proceedings of the 2018*

Conference on Empirical Methods in Natural Language Processing, 5016-26. Brussels, Belgium: Association for Computational Linguistics. <https://doi.org/10.18653/v1/D18-1547>.

Experiments

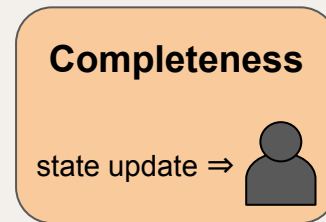
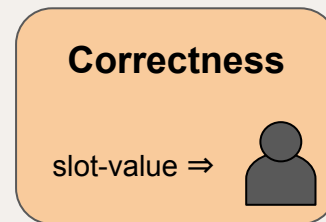
models



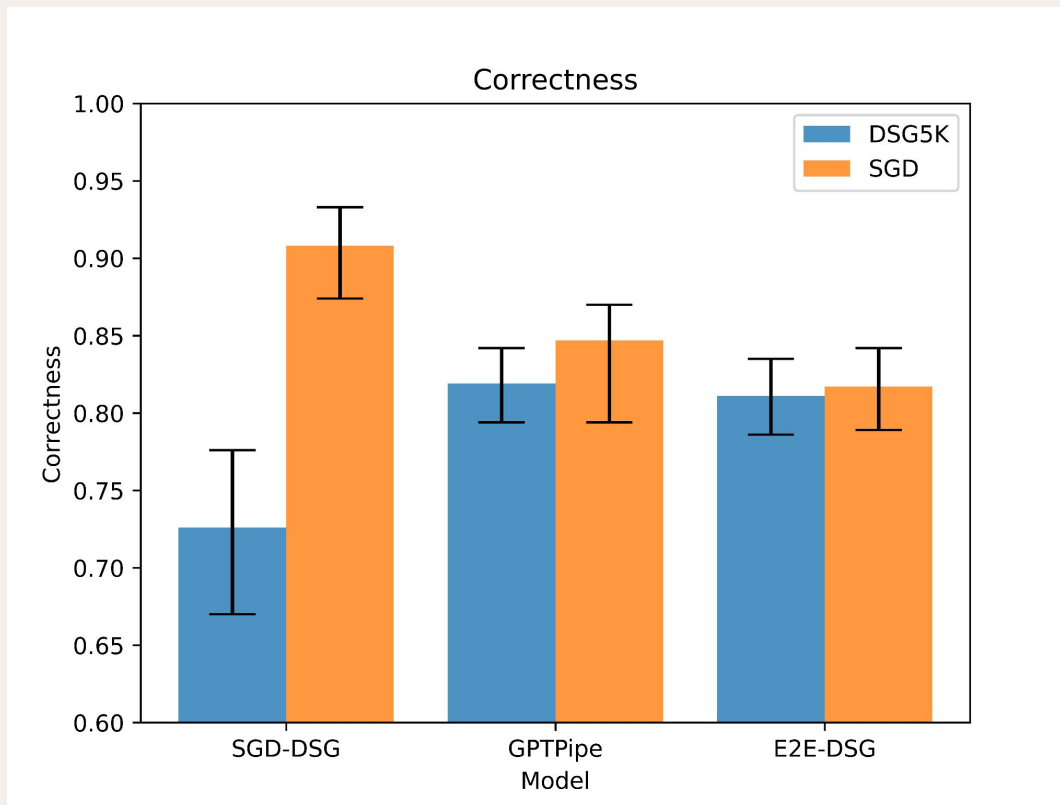
test data



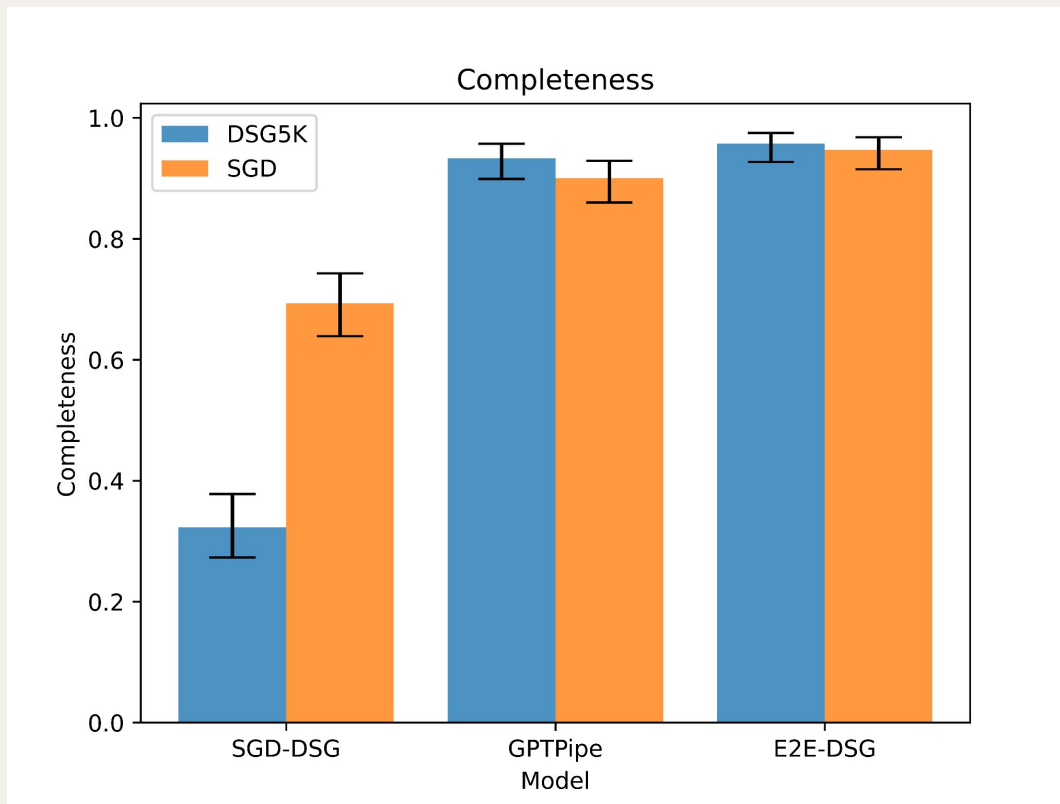
metrics



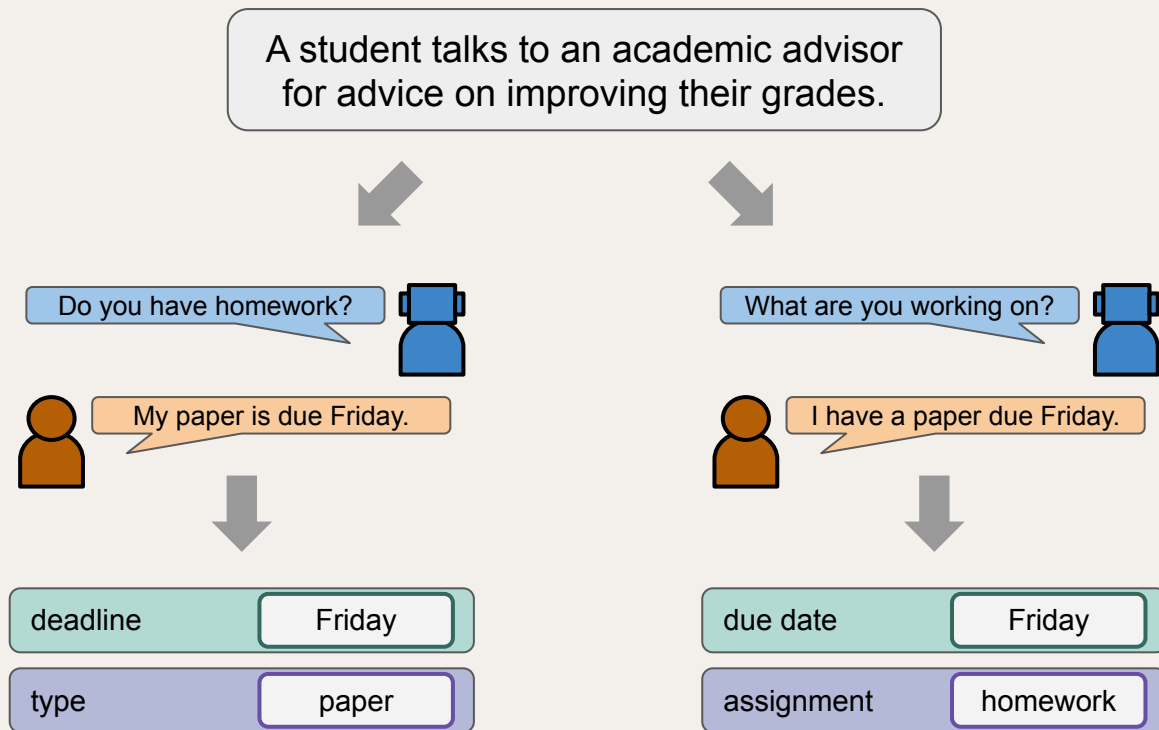
Results - Correctness



Results - Completeness



Limitation: Schema Inconsistency



Conclusion

- Domain-general inference of dialogue state
- Limitation: schema consistency
- Future work: resolve schema consistency
- Use DSG for generating diverse DST training data

References

- Budzianowski, Paweł, Tsung-Hsien Wen, Bo-Hsiang Tseng, Iñigo Casanueva, Stefan Ultes, Osman Ramadan, and Milica Gašić. 2018. “MultiWOZ - A Large-Scale Multi-Domain Wizard-of-Oz Dataset for Task-Oriented Dialogue Modelling.” In *Proceedings of the 2018 Conference on Empirical Methods in Natural Language Processing*, 5016–26. Brussels, Belgium: Association for Computational Linguistics. <https://doi.org/10.18653/v1/D18-1547>.
- Rastogi, Abhinav, Xiaoxue Zang, Srinivas Sunkara, Raghav Gupta, and Pranav Khaitan. 2020. “Towards Scalable Multi-Domain Conversational Agents: The Schema-Guided Dialogue Dataset.” *Proceedings of the AAAI Conference on Artificial Intelligence* 34 (05): 8689–96. <https://doi.org/10.1609/aaai.v34i05.6394>.
- Raffel, Colin, Noam Shazeer, Adam Roberts, Katherine Lee, Sharan Narang, Michael Matena, Yanqi Zhou, Wei Li, and Peter J. Liu. 2020. “Exploring the Limits of Transfer Learning with a Unified Text-to-Text Transformer.” *The Journal of Machine Learning Research* 21 (1): 140:5485-140:5551.