User-centric dialogue models

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User-centric dialogue model

- Half of dialogue comes from the user
- Ultimate evaluation is interactive evaluation
- Why do we need user models?
  - Scalable evaluation
  - Reinforcement learning training
  - Model-based reinforcement learning

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A brief history of user simulation

- We tried a lot of things but in the end a hand-crafted simulator is just the best
- Why is that?
- Statistical approaches to user simulation
  - Either do not work particularly well
  - Too labour intensive
  - Domain dependent

Transformer-based User Simulator

- Domain independent -> can support zero-shot transfer
- Transformer-based -> not restricted by number of concepts in the ontology
- Each slot represented by domain independent
    - general,
    - user,
    - system, and
    - index

features
- Trained on MultiWOZ dataset

Evaluation

- Direct evaluation
  - Accuracy on the test set
- Indirect evaluation
  - Cross-model evaluation
  - Zero-shot transfer
  - Interactive human evaluation

Human evaluation

- Indirect evaluation of the user simulator
- ABUS – agenda-based US
- TUS – transformer based
- TUS-noX - the simulator hasn't seen X data during training
- Policies trained with different user simulators on all domains evaluated in interaction with volunteers

US for training	success			overall
	Attr.	Hotel	all	
ABUS	0.76	0.70	0.83	3.90
TUS	0.73	0.69	0.83	4.03
TUS-noAttr	0.75	0.54	0.81	4.01
TUS-noHotel	0.73	0.55	0.76	3.86

Lin H-C, Lubis N, Hu S, Van Niekerk C, Geishauser C, Heck M, Feng M, Gašić M, Domain-ind User Simulation with Transformers for Task-oriented Dialogue Systems, SIGDIAL, 2021

Conclusions

- User models are essential tools for user-centric dialogue models
- Evaluation: they produce a large number of possible dialogue paths
- TUS – domain independent data-driven user simulator
- Can compete with ABUS
- Future work: NLG, persona, etc

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