QRFA: A Data-Driven Model of Information Seeking Dialogues

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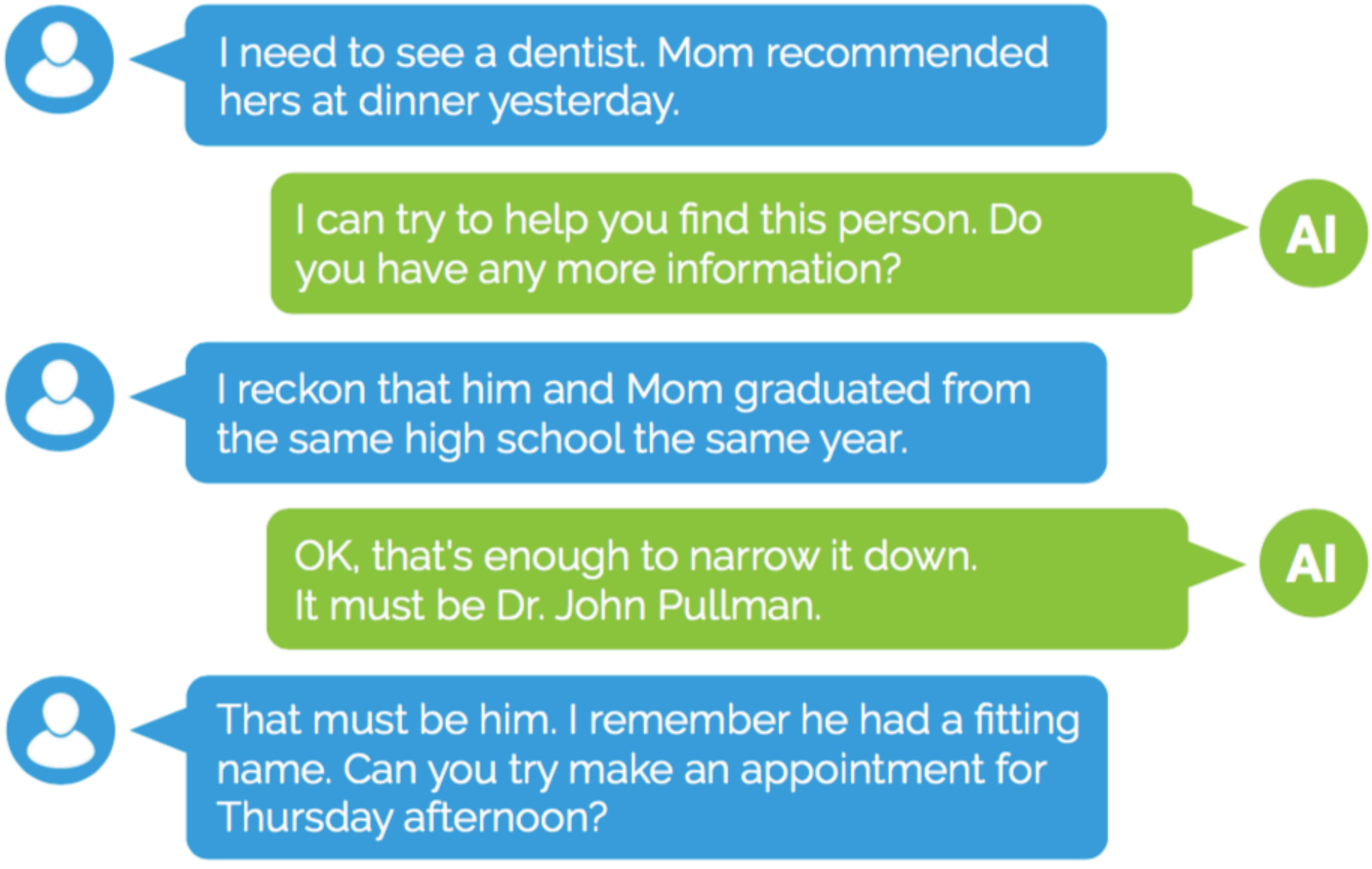
Conversational Search

RQ: What is the structure of an information-seeking dialogue?



Why Analyse Conversations?

Grounded theory - simple interpretable model based on data

Enable

- Human-in-the-loop
- Collaboration & Discussion
- Breakdown detection

Inform

- System design
- Data collection & cleaning
- System evaluation

https://blogs.nasa.gov/ISS_Science_Blog/2010/12/10/post_1291390819440/

Conversation Mining

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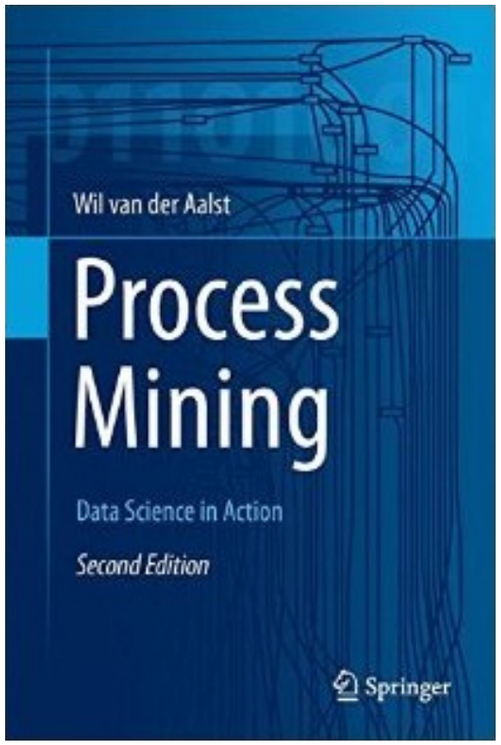
1. Dialogue **annotation**
   - supervised classification

2. Process **discovery** (model "as-is")
   - frequent sequence mining

3. Process **repair** (model "to-be")

4. Process **evaluation**
   - conformance checking



Wil M. P. van der Aalst: Process Mining - Data Science in Action, Second Edition. Springer 2016

Mining Information-Seeking Dialogues

4 publicly available **datasets**

Seeker (User) - Intermediary (Agent)

- **Spoken Conversation Search** 39 dialogues 13 labels
- **Open Data Exploration** 26 dialogues 20 labels
- **DSTC1** bus schedules 15,866 dialogues 37 labels
- **DSTC2** restaurant reservation 2,118 dialogues 21 labels

QRFA Annotation Schema

		Proactive	
User	**Q**uery	Information	
		Prompt	
Agent	**R**equest	Offer	
		Understand	

QRFA Annotation Schema

	Proactive		Reactive	
User	**Q**uery	Information	**F**eedback	Positive
		Prompt		Negative
Agent	**R**equest	Offer	**A**nswer	Results
		Understand		Backchannel
				Empty

Dialogue Annotation

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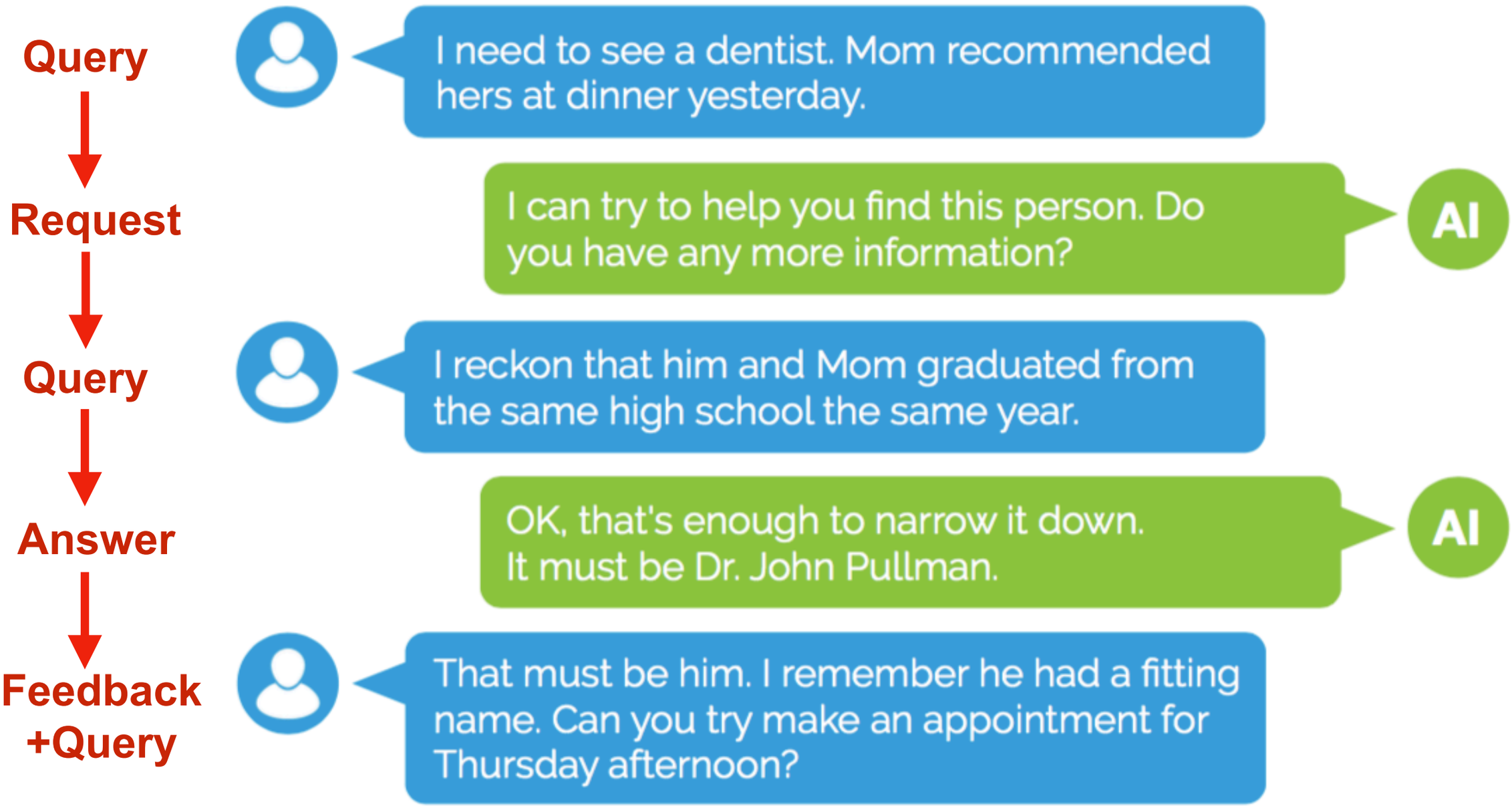
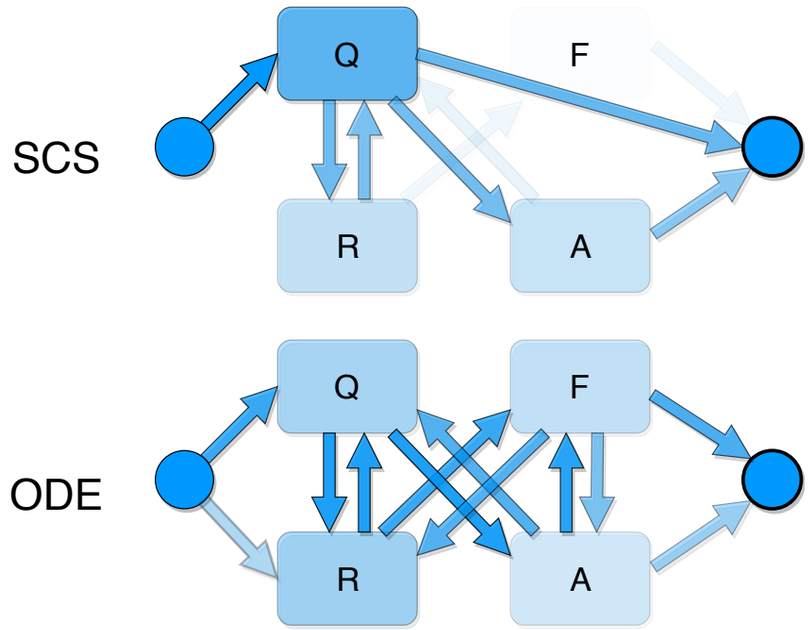


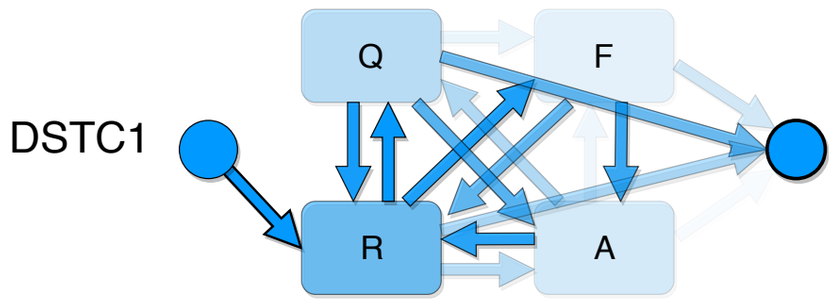
QRFA Model

- **SCS** 39 web search dialogues

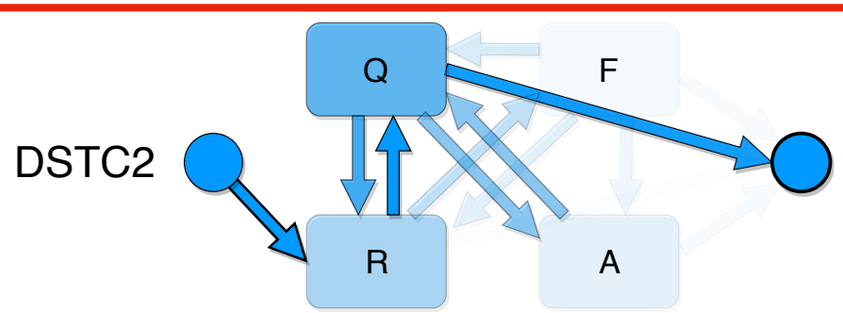


- **ODE** 26 Open Data dialogues

- **DSTC1** 15,866 bus schedule dialogues



- **DSTC2** 2,118 restaurants dialogues



QRFA Model

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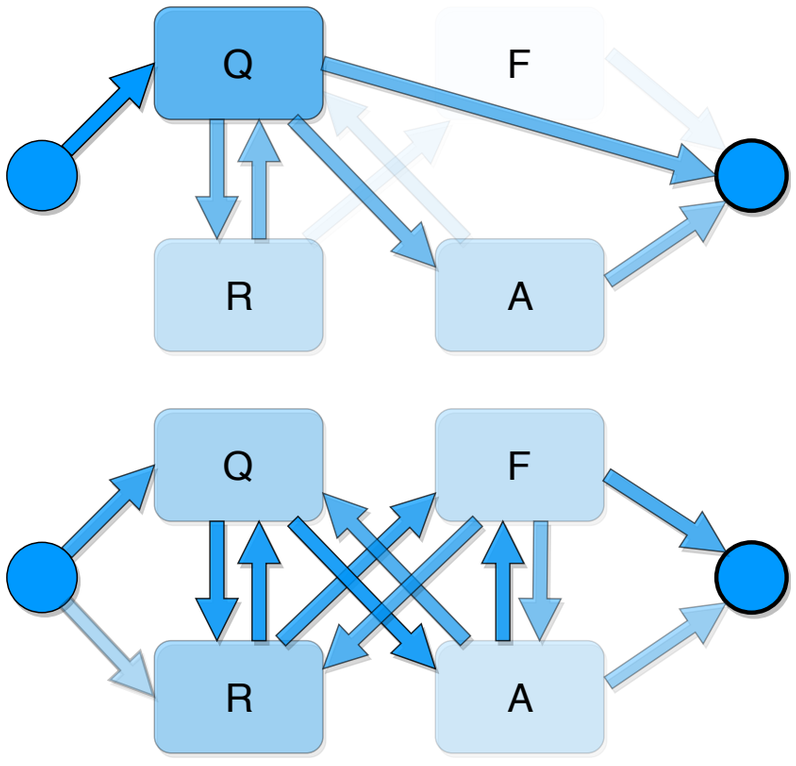
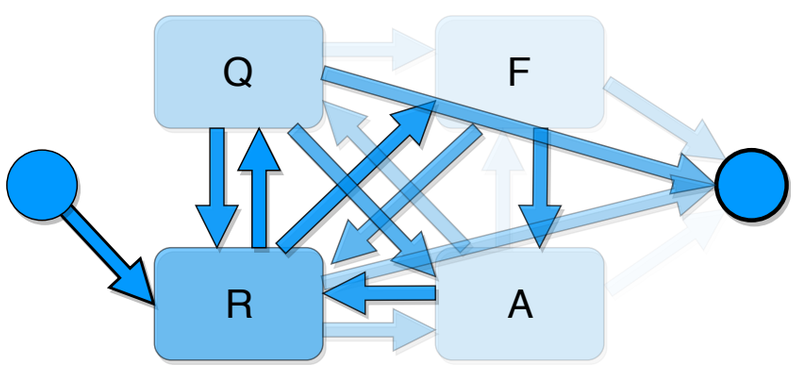
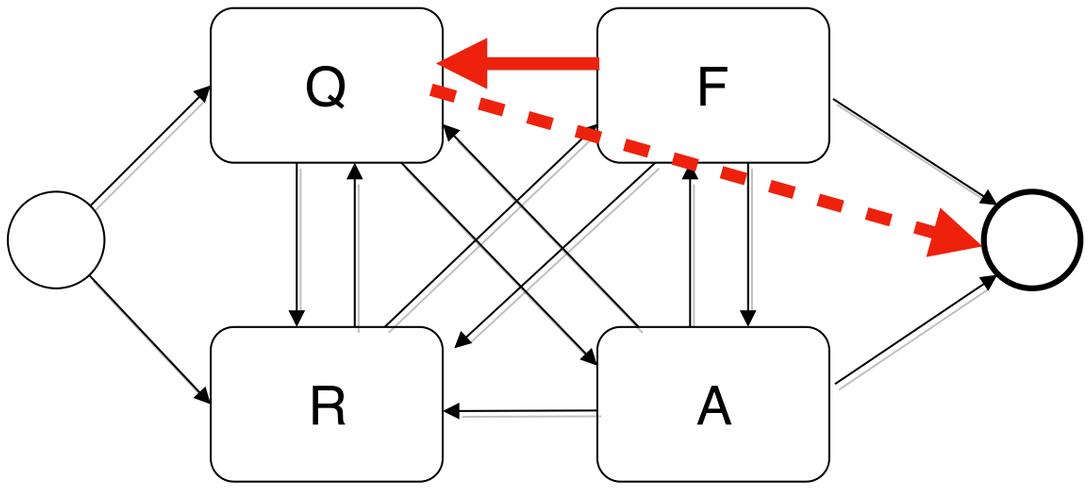
SCS



ODE

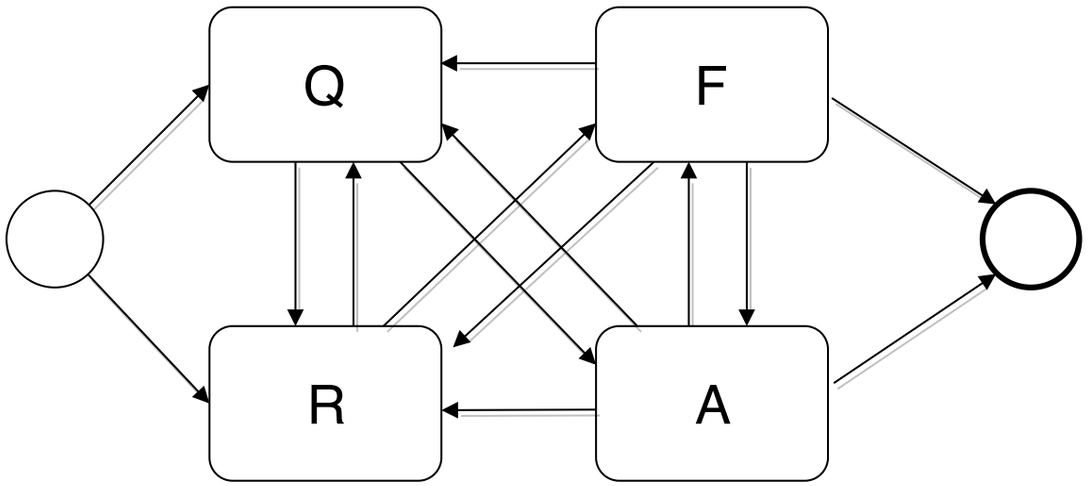
DSTC1



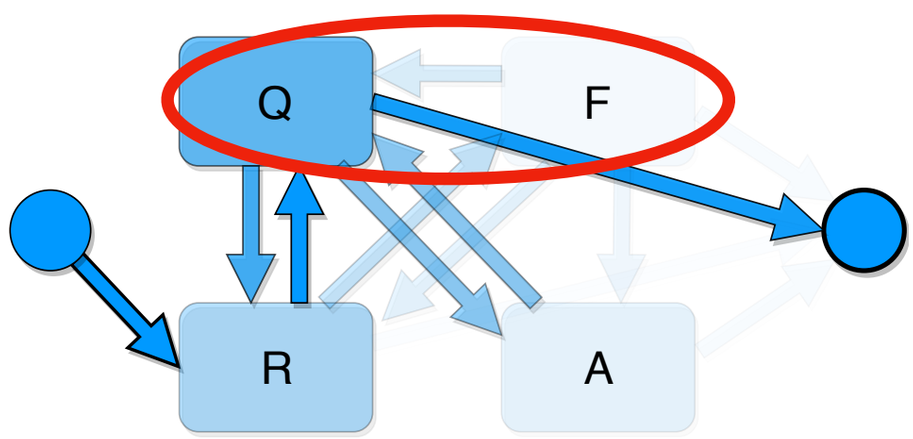


Model Evaluation

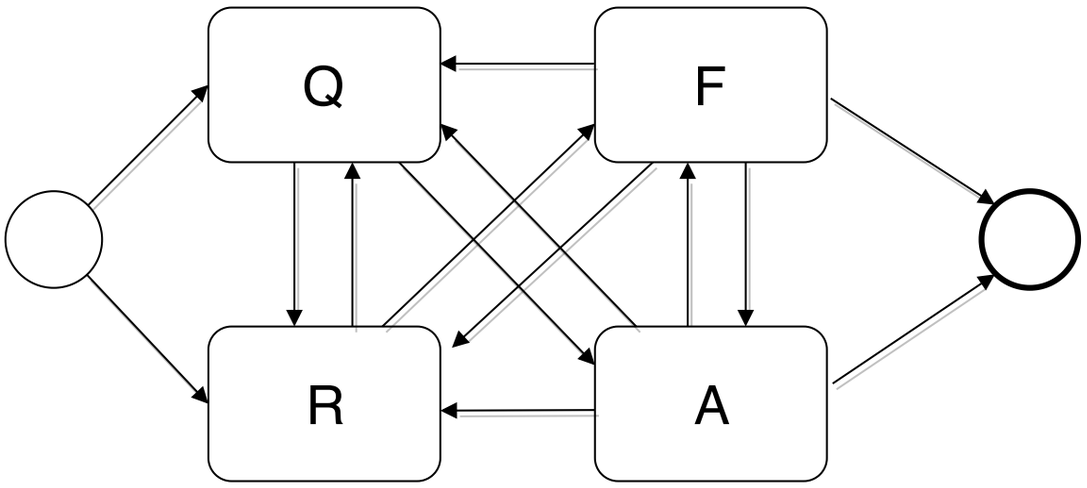
- **Fitness**/case: Min 0.65 Max 1 Average 0.96 SD 0.04
- Cases with value 1: 0.61
- **Break-down detection:** P 0.92 R 0.55

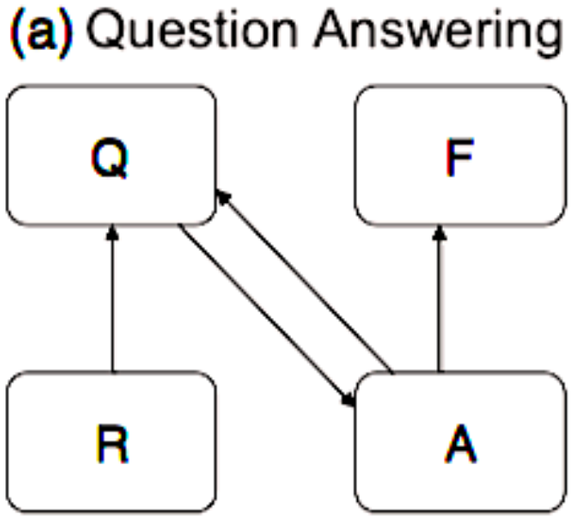


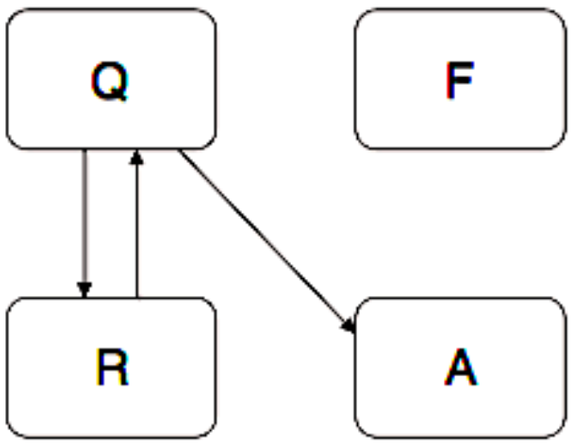
DSTC2

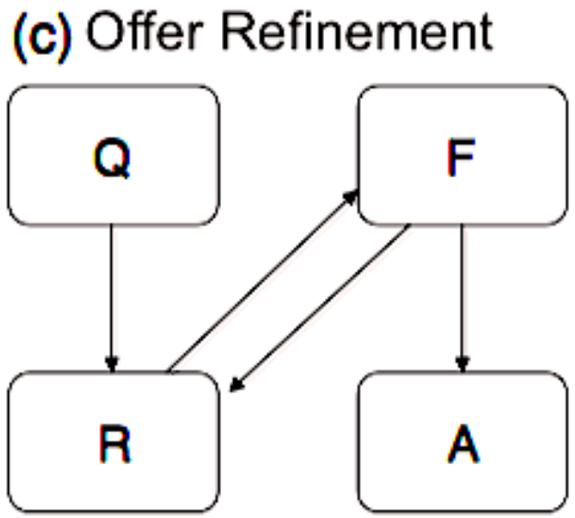


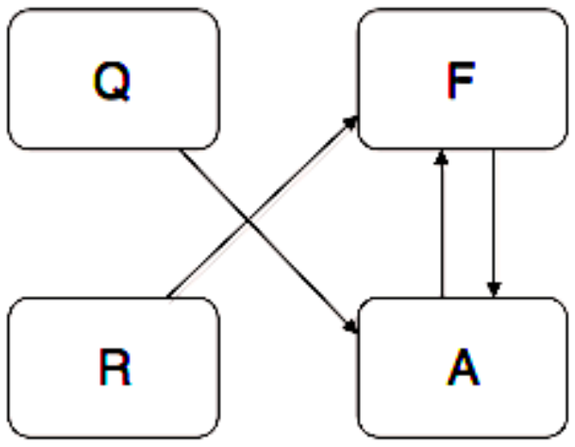
Loops as Interaction Modes











Conclusions and Future Work

- We proposed **conversation mining** for analysing transcripts
- and used it to extract **QRFA** model of information-seeking dialogues
- Future work: **complex** models integrating more labels & datasets

Data + Code: https://github.com/svakulenk0/conversation_mining

@svakulenk0 @katerevoredo @mdr

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MORE INFORMATION HTTPS://IKTDERZUKUNFT.AT/EN/

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