



Global-Locally Self-Attentive Dialogue State Tracker



Salesforce Research

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Overview

Motivation

- Dialogue state tracking, which estimates user goals and requests given the dialogue context, is an essential part of goal-oriented dialogue systems
- Existing methods do not address the extraction of rare states (e.g. slot-value pairs), which are prominent in problems with large ontology.

Proposal

- We propose GLAD, which uses global modules to share parameters between estimators for each slot and local modules to learn slot-specific feature representations.

Result

- We obtain state-of-the-art results on the WoZ and DSTC2 state tracking tasks.

Model	DSTC2		WoZ	
	Joint Goal	Turn Request	Joint Goal	Turn Request
Delexicalization-based Model	69.1%	95.7%	70.8%	87.1%
Delex. + Semantic Dictionary	72.9%	95.7%	83.7%	87.6%
Neural Belief Tracker - DNN	72.6%	96.4%	84.4%	91.2%
Neural Belief Tracker - CNN	73.4%	96.5%	84.2%	91.6%
GLAD	74.5 ± 0.2%	97.5 ± 0.1%	88.1 ± 0.4%	97.1 ± 0.2%

Test accuracies. We run 10 randomly seeded models and report the mean and std.

Model	Turn goal	Joint goal	Turn Request
GLAD	93.7%	88.8%	97.3%
w/o global	88.8%	73.4%	97.3%
w/o local	93.1%	86.6%	95.1%
w/o self-attention	91.6%	84.4%	97.1%
w/o LSTM	88.7%	71.5%	93.2%

Ablation study using the WoZ development set.

Example Dialogue

User System

User utterance

Where would you go to eat in the south part of town?

Turn goals and requests

inform(area=south)

System actions

request(food)

request(price range)

System response

ok I can help you with that. Are you looking for a particular type of food, or within a specific price range?

I just want to eat at a cheap restaurant in the south part of town. What food types are available, can you also provide some phone numbers?

inform(price range=cheap)

inform(area=south)

request(phone)

request(food)

I found two restaurants serving cheap food. Would you prefer Portuguese or Chinese food?

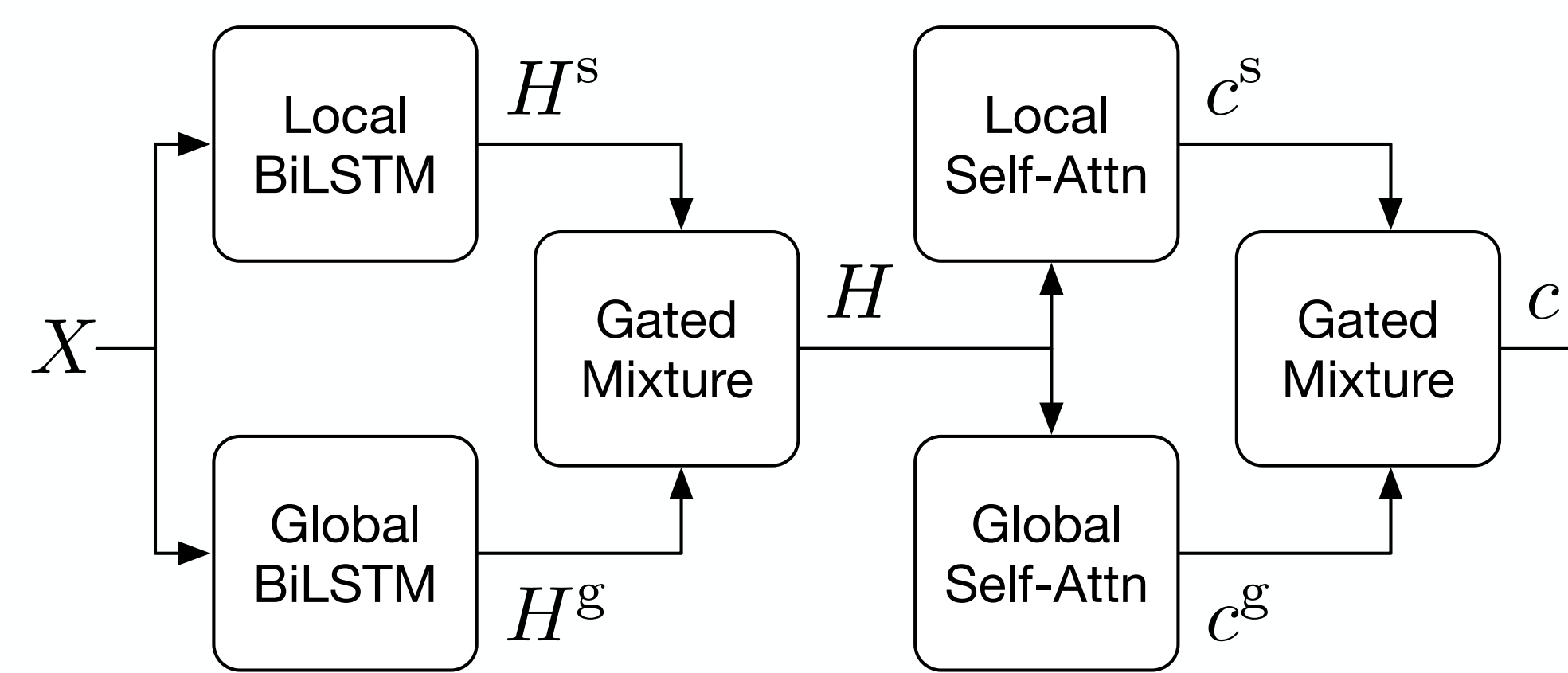
Either is fine, can I have the phone number please?

request(phone)

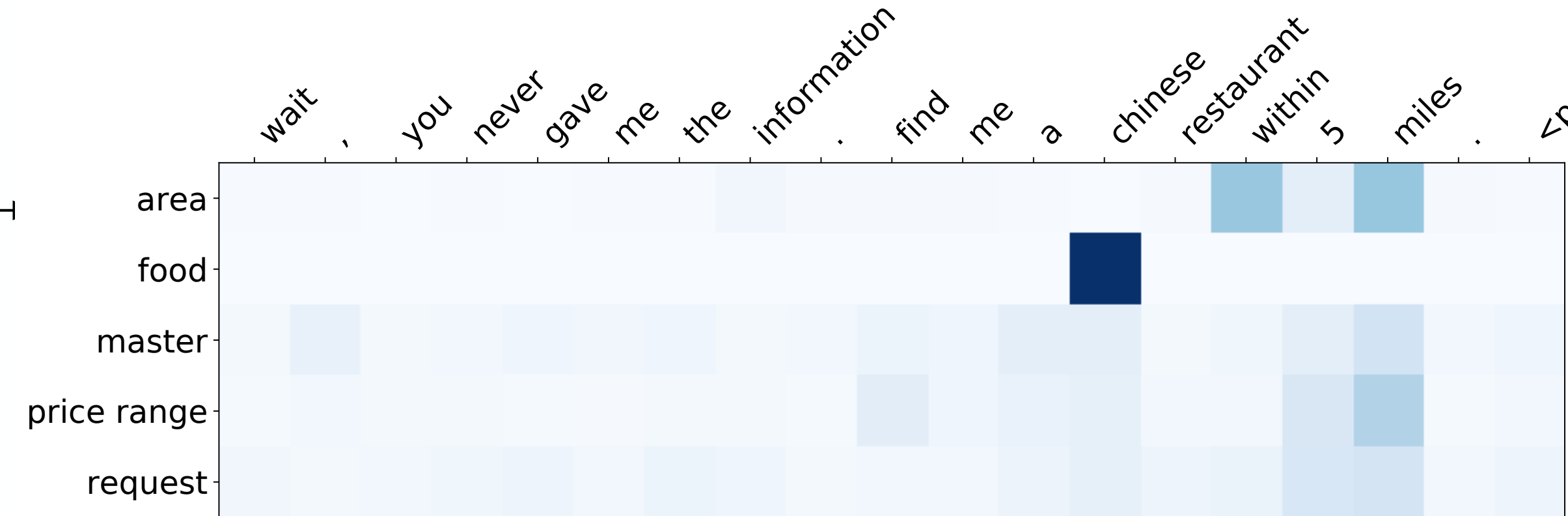
The lucky start is at 01223 244277 and Nandos is at 01223 327908.

Thank you very much.

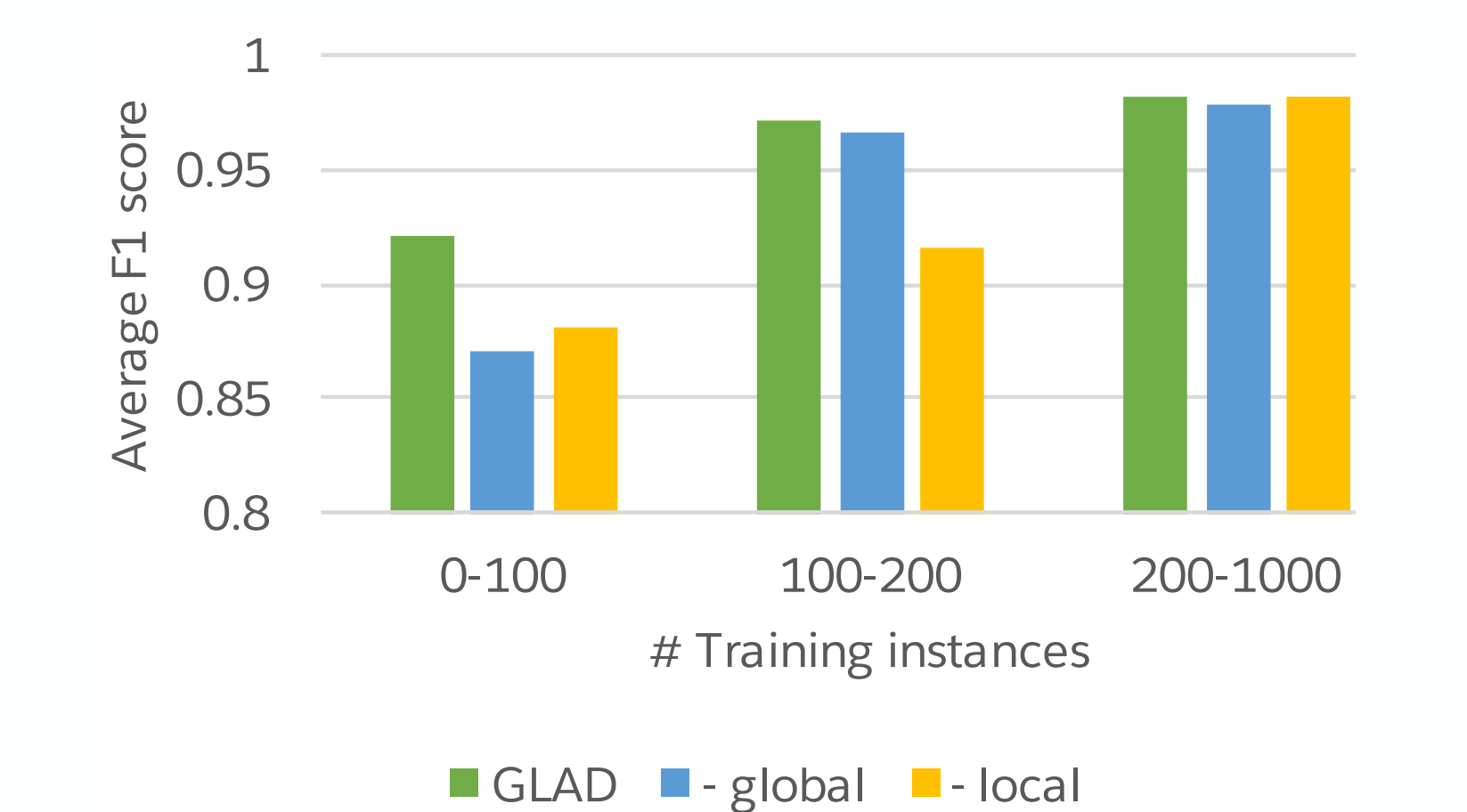
Global-Locally Self-Attentive Encoder



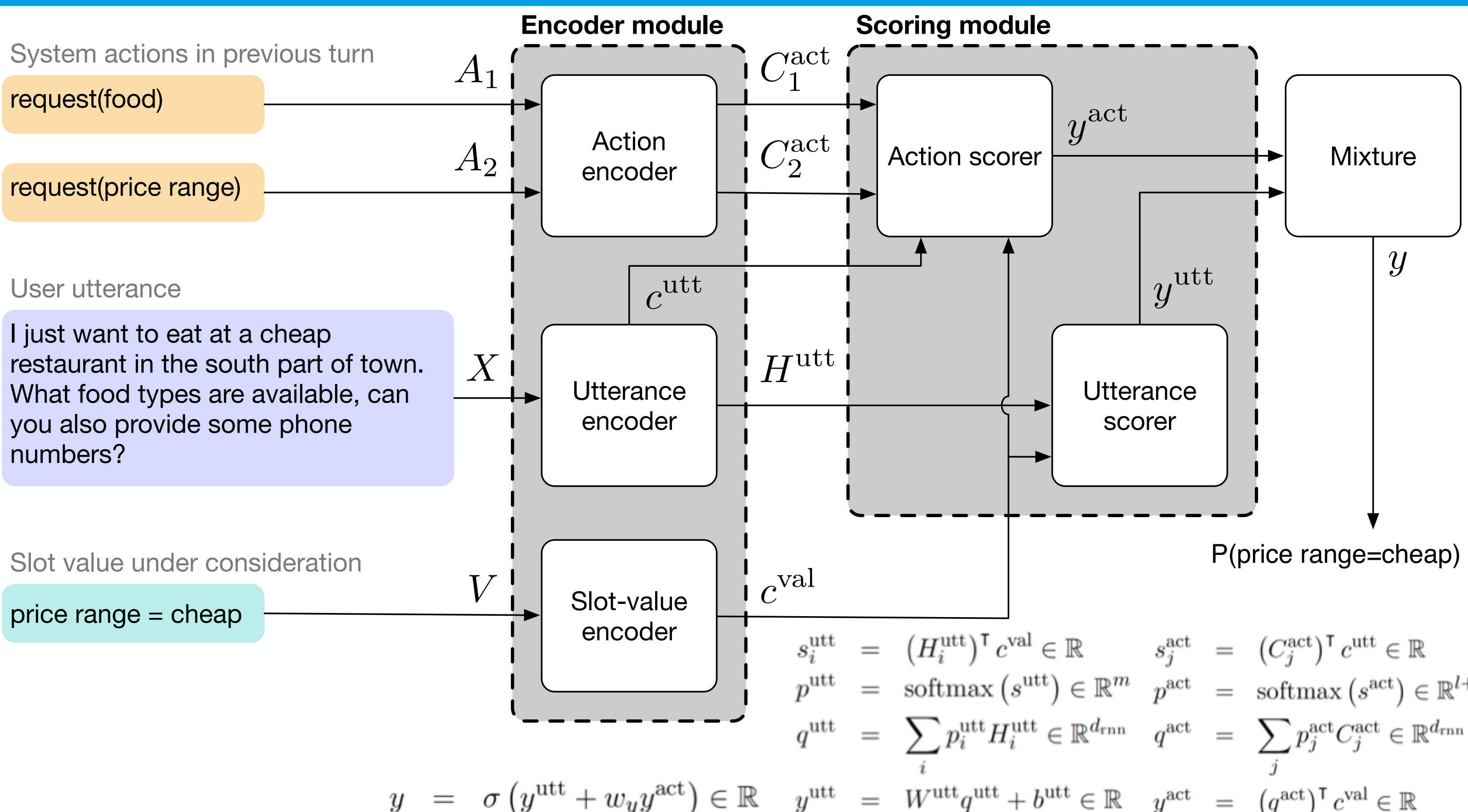
- Slot-specific modules emphasize relevant key words and phrases to that slot
- Global module attends to all relevant key words



- Global-local modules outperform on rare states



GLAD



Example Predictions

System actions in previous turn	User utterance	Predicted turn belief state
N/A	I would like Polynesian food in the South part of town. Please send me phone number and address.	request(phone) request(address) inform(food=polynesian) inform(area=south)
request(address) request(phone)	Yes please.	request(phone) request(address)
	There is a moderately priced italian place called Pizza hut at cherry hilton. would you like the address and phone number?	
request(food) request(price range)	I just want to eat at a cheap restaurant in the south part of town. What food types are available, can you also provide some phone numbers?	request(phone) inform(price range=cheap) inform(area=south) inform(food=dontcare) +request(food)
	ok I can help you with that. Are you looking for a particular type of food, or within a specific price range?	