

Few-Shot Generalization Across Dialogue Tasks

Research behind Rasa Core



Question

Few-Shot

Cross-Domain

Uncooperation

I'm looking for a place to eat

I know lots of restaurants!
Anything specific?

I love chatbots

Everybody does!

So, which cuisine?

A cheap one

Ok, and what city?

Actually, something fancy

Ok, expensive it is.

So which city?

Can you show me some restaurants yet?

I need some more info first.
Where would you like to eat?

Why?


I need to know which city to search for restaurants.

Chitchat: Making small-talk or asking questions unrelated to the task

Correction: User has changed their mind about something

Broad context: Questions referring to the broader context of conversation, such as the status of the current task

Narrow context: Questions referring to immediate context, e.g. the most recent system utterance



Uncooperative Dialog



Features Embedding

User Intent

System Action

Dialog Slots



Features Embedding

User Intent & System Action:

Bag of word, e.g. action_search_restaurant =
{action, search, restaurant}

Dialog Slots



Features Embedding

User Intent & System Action

Dialog Slots:

Binary vectors, indicating their presence or absence at each step of the dialogue.

Simple slot tracking method, overwriting each slot with the most recently specified value.



Target

Model(

Embedding(User Intent),

Embedding(Dialog Slots)

) \approx Embedding(System Action)



Loss Function

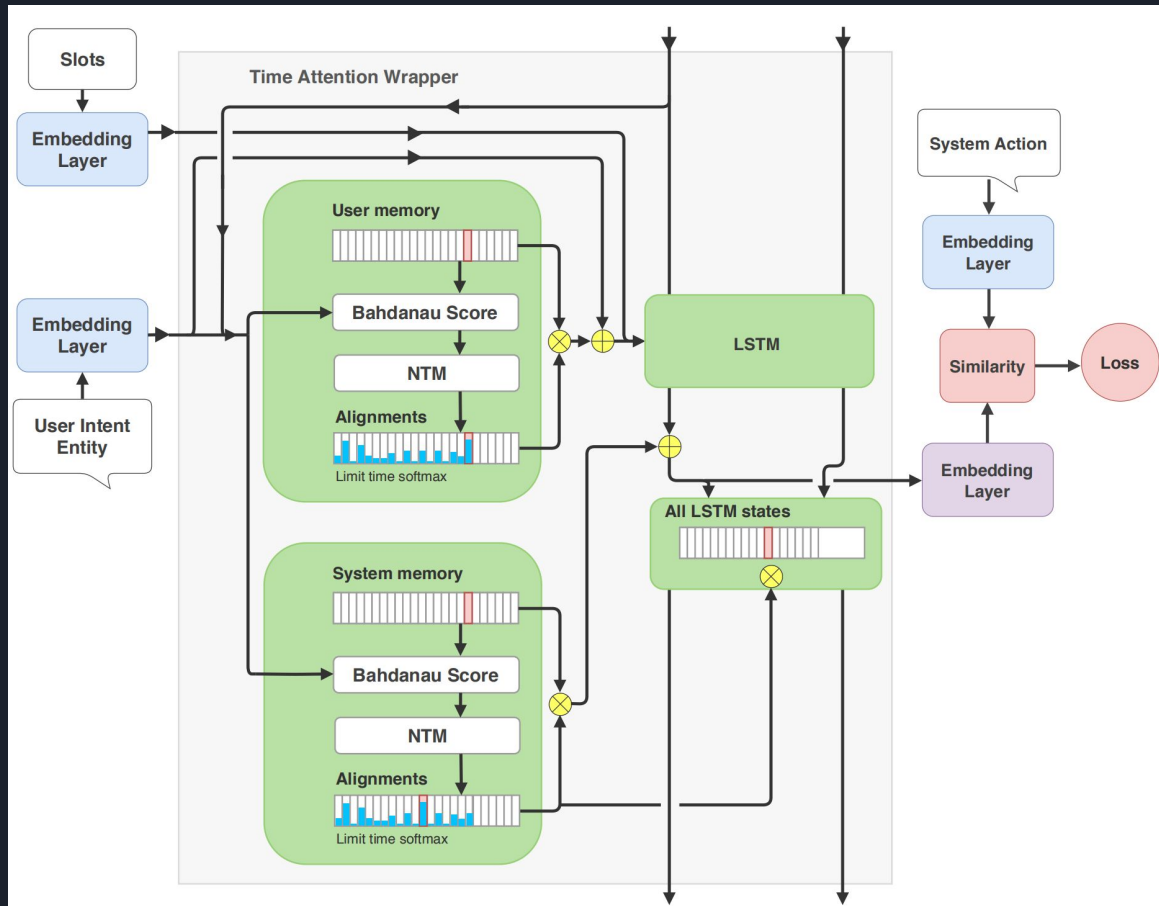
Alpha: System Dialog State

Beta+: Correct System Action

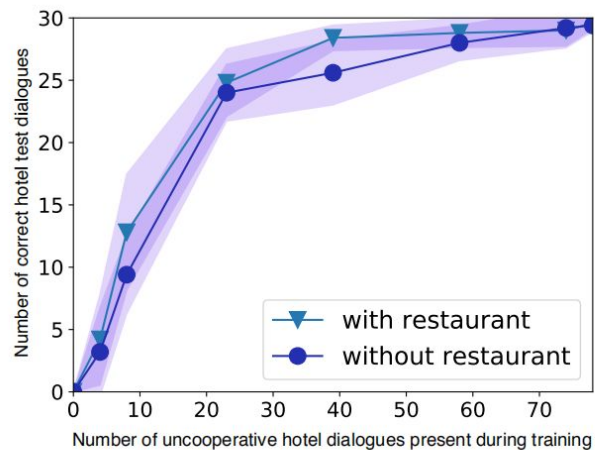
Beta-: Negative System Action

Mu: Hyper-parameters

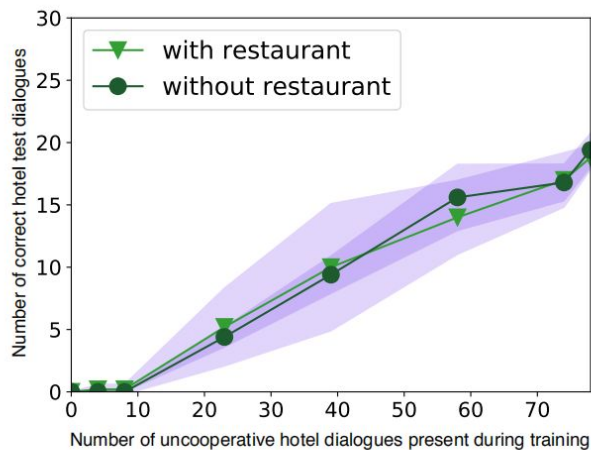
$$L_t = \max\left(\mu_+ - \text{sim}(a, b_+), 0\right) + \max\left(\mu_- + \max_{b_-}(\text{sim}(a, b_-)), 0\right).$$



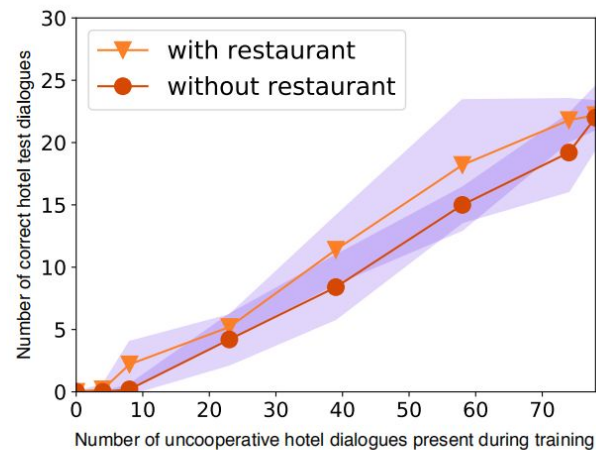
Structure



(a) REDP



(b) LSTM (bin)



(c) LSTM (lt)

Uncooperative Dialog