



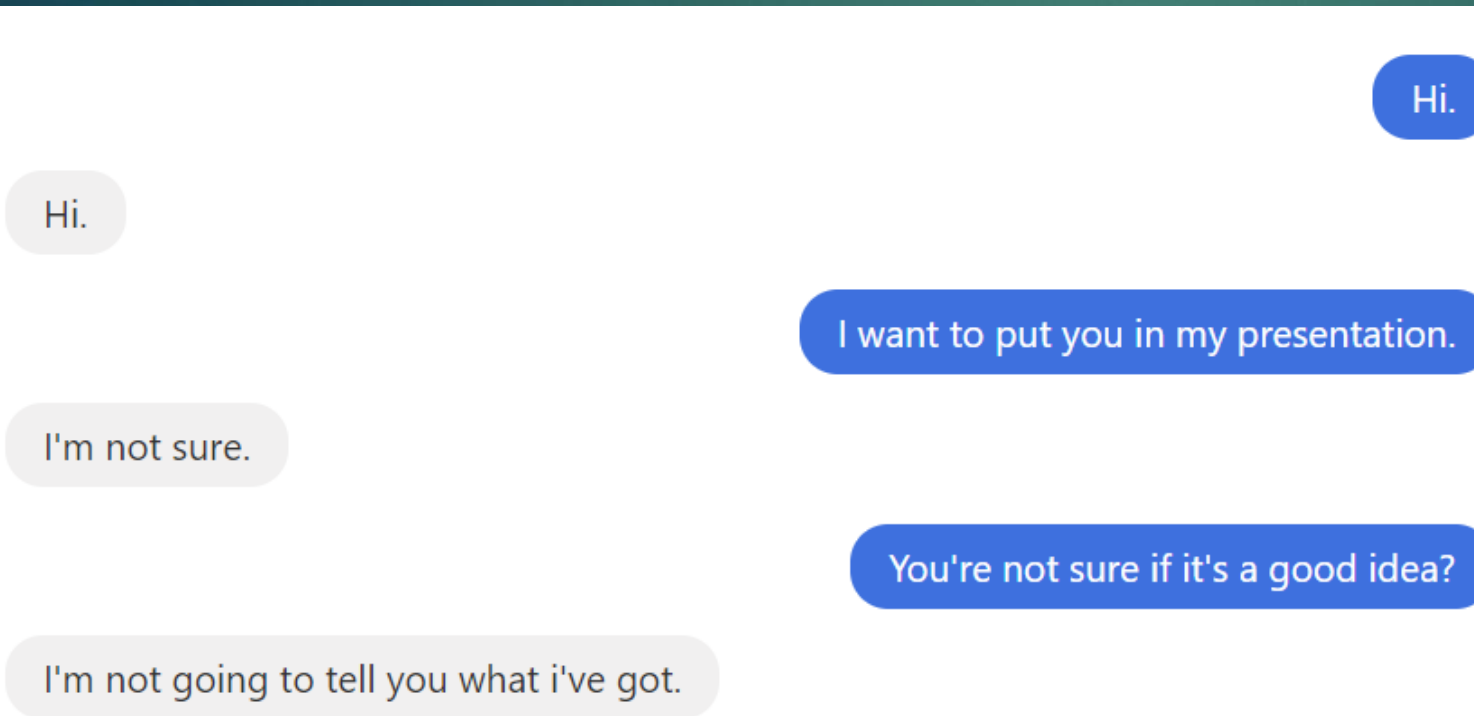
Neural Chatbots

CSÁKY RICHÁRD

github.com/ricsinaruto/Seq2seqChatbots

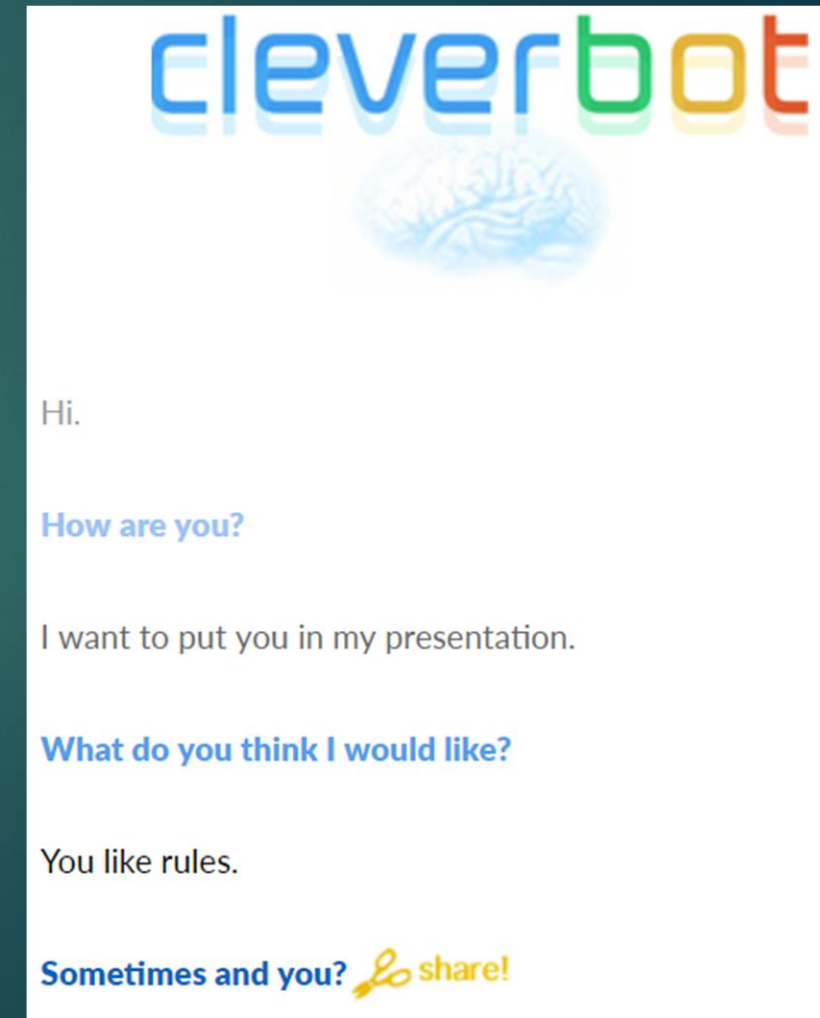
Chatbot types

Neural



A screenshot of a chatbot conversation interface. The chat window has a white background. On the left, there are three light gray speech bubbles representing user messages: "Hi.", "I'm not sure.", and "I'm not going to tell you what i've got.". On the right, there are three blue speech bubbles representing chatbot responses: "Hi.", "I want to put you in my presentation.", and "You're not sure if it's a good idea?".

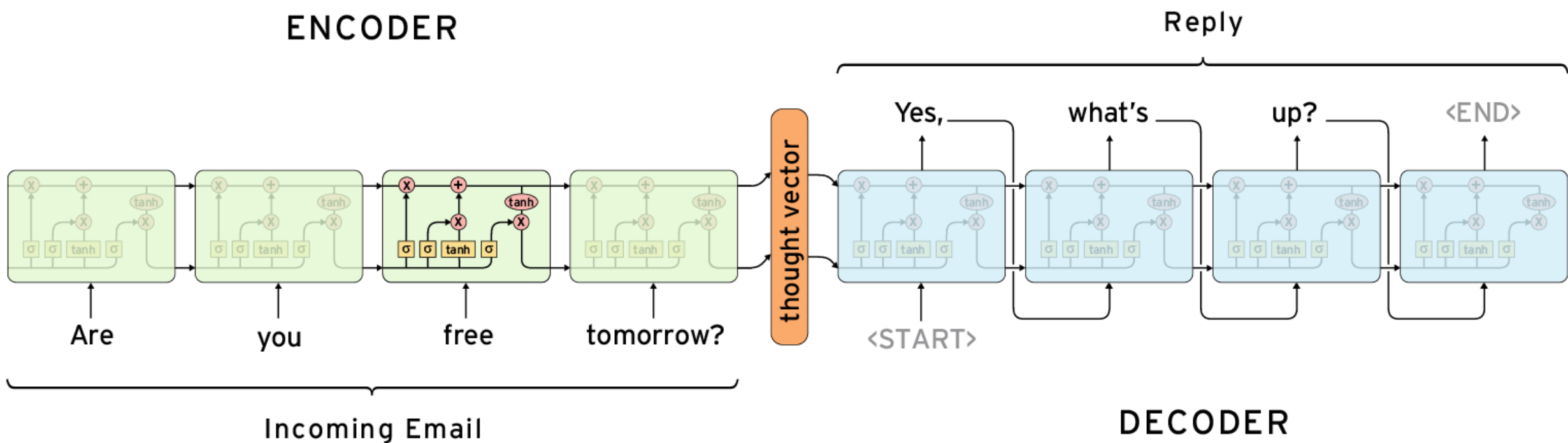
Rule-based



A screenshot of the Cleverbot website. At the top, the "cleverbot" logo is displayed in a colorful, multi-colored font, with a blue brain icon below it. Below the logo, a chat conversation is shown. The chat window has a white background. On the left, there are three light gray speech bubbles representing user messages: "Hi.", "How are you?", and "What do you think I would like?". On the right, there are three blue speech bubbles representing chatbot responses: "Hi.", "I want to put you in my presentation.", and "You like rules.". At the bottom right, there is a yellow "share!" button with a share icon.

Seq2seq (2014)

$$\frac{1}{s} \sum_{T, S \in \mathcal{S}} \log(p(T|S))$$



Datasets

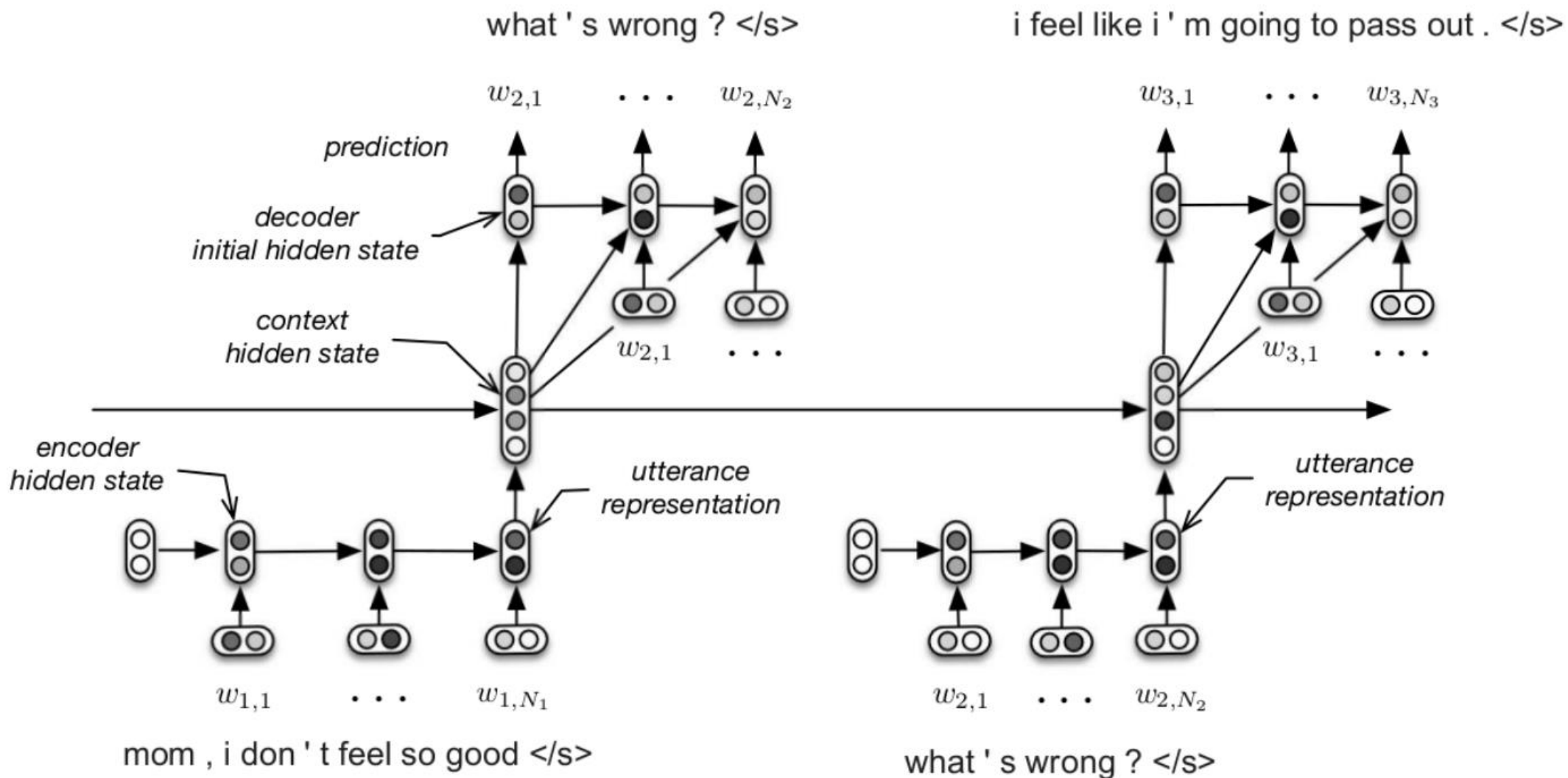
- ▶ Twitter, Reddit
- ▶ Movie subtitles
- ▶ Crowdsourced conversations

Evaluation

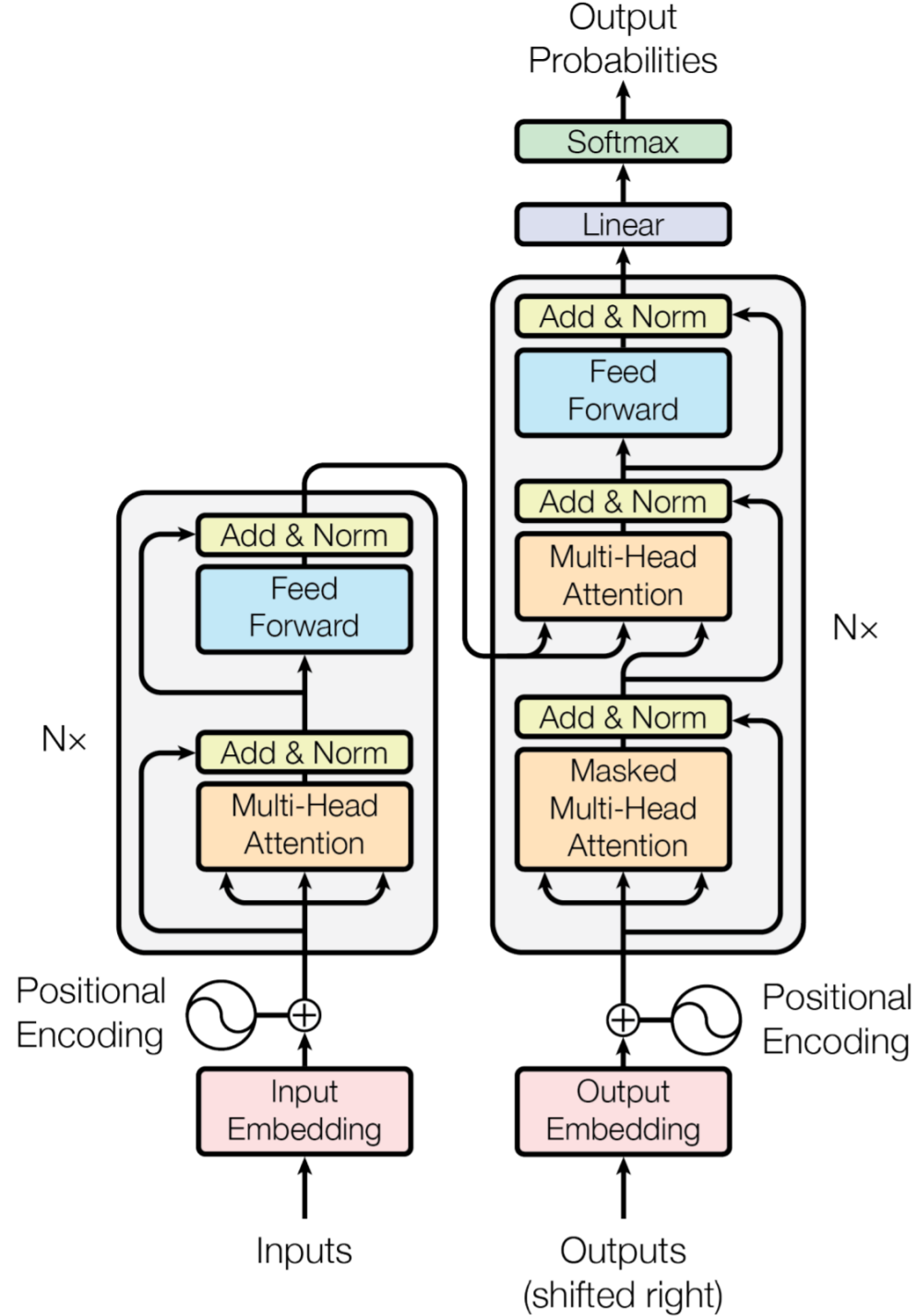
- ▶ Compare to target utterance (embedding, perplexity)
- ▶ Diversity (entropy)
- ▶ Human evaluation

HRED (2015)

<https://arxiv.org/pdf/1507.04808.pdf>

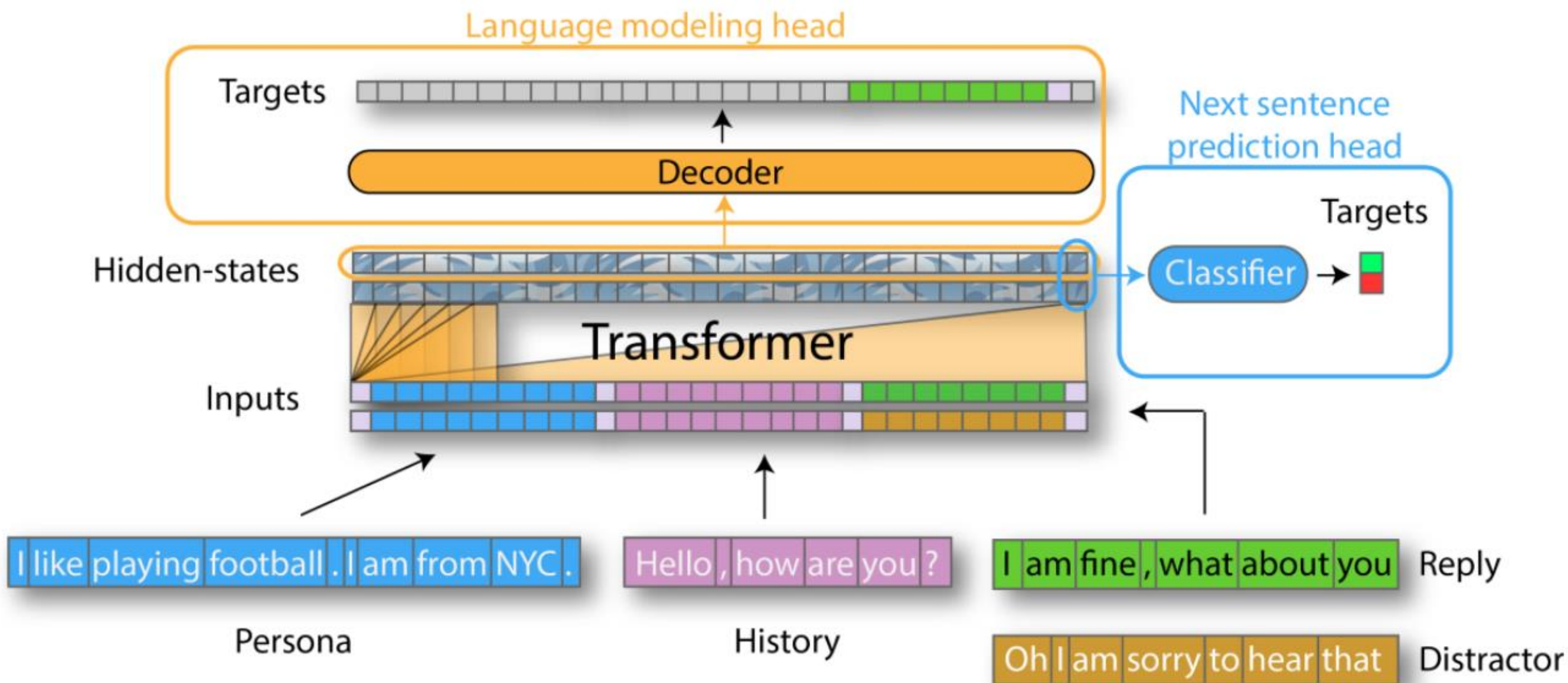


Transformer (2017)



GPT-2 (2019)

<https://medium.com/huggingface/how-to-build-a-state-of-the-art-conversational-ai-with-transfer-learning-2d818ac26313>



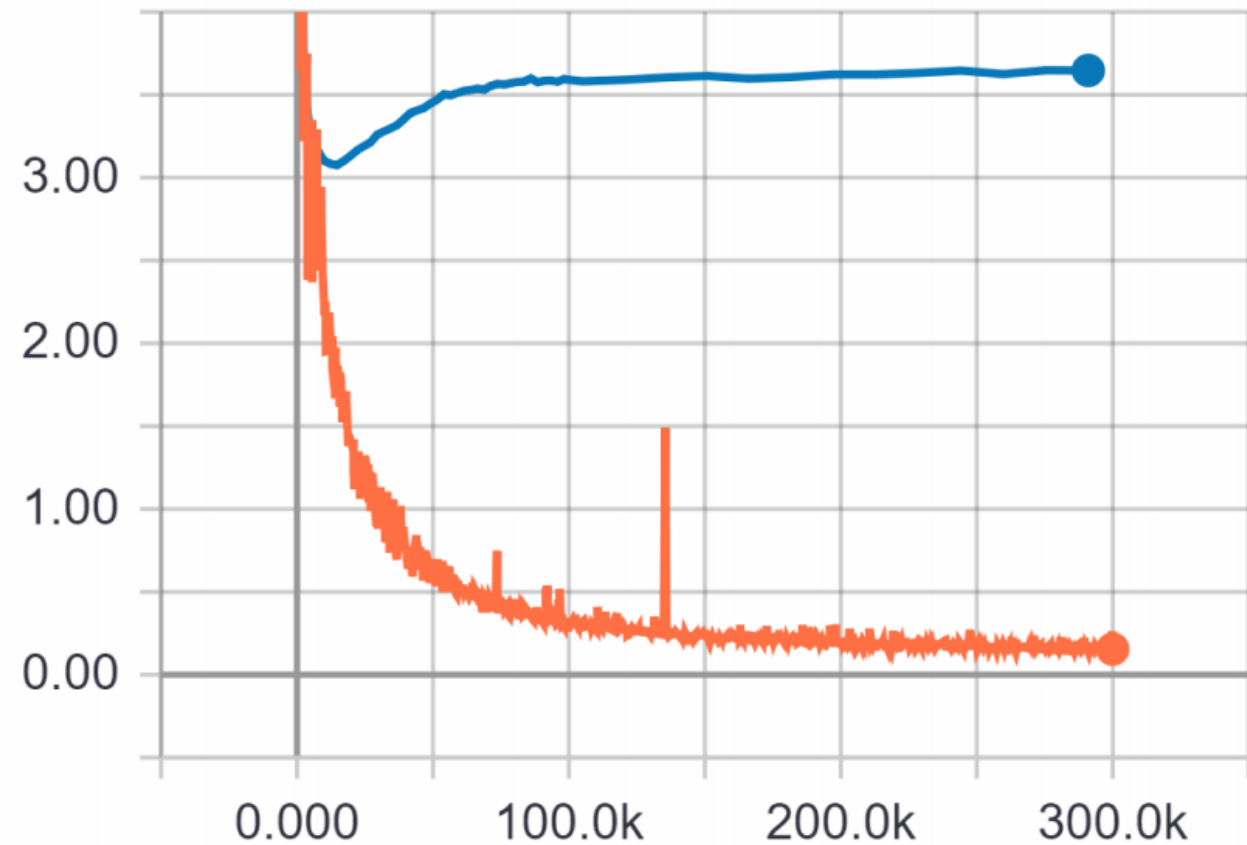
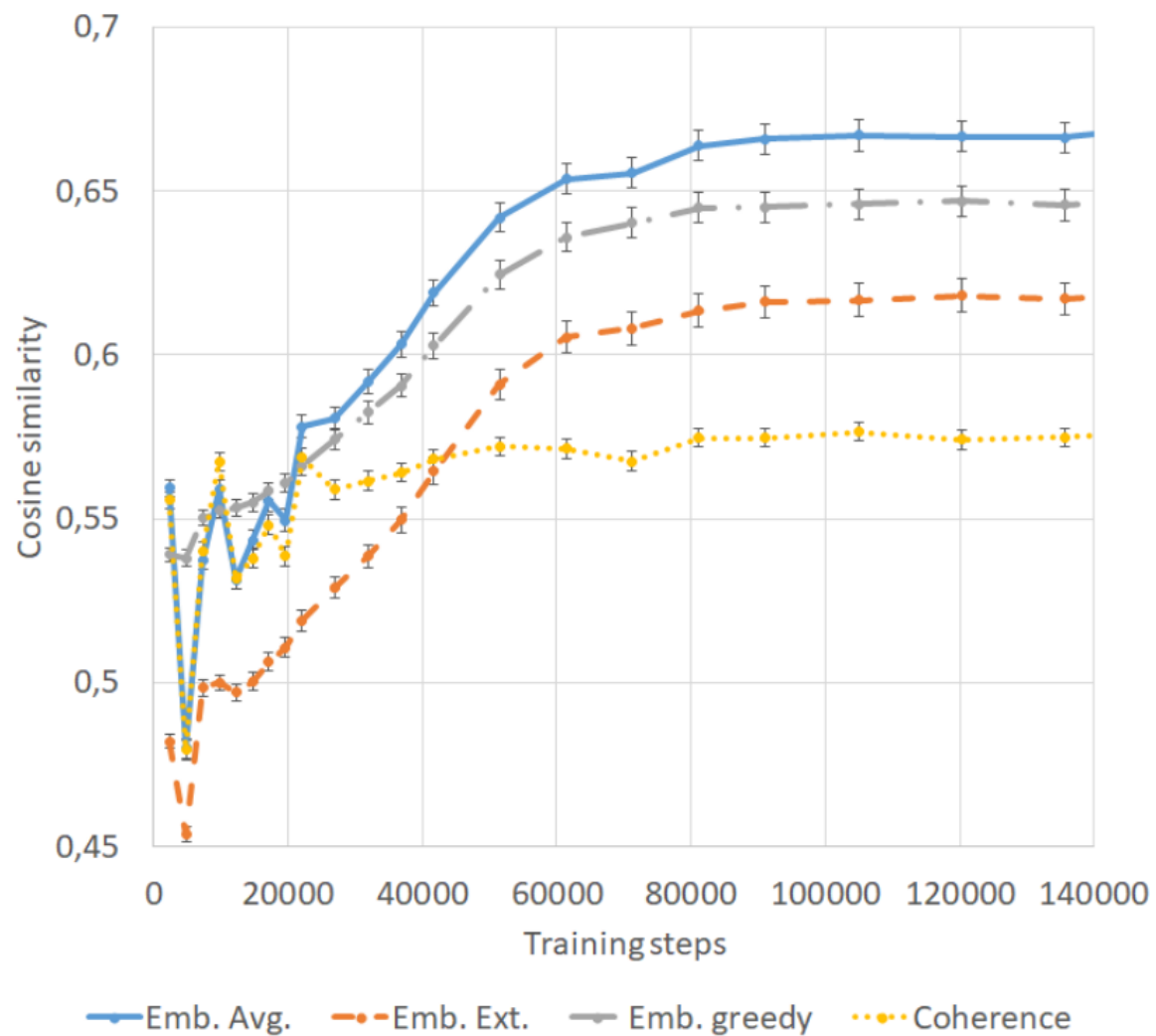
Issues: Data

- ▶ Not natural
- ▶ Not enough

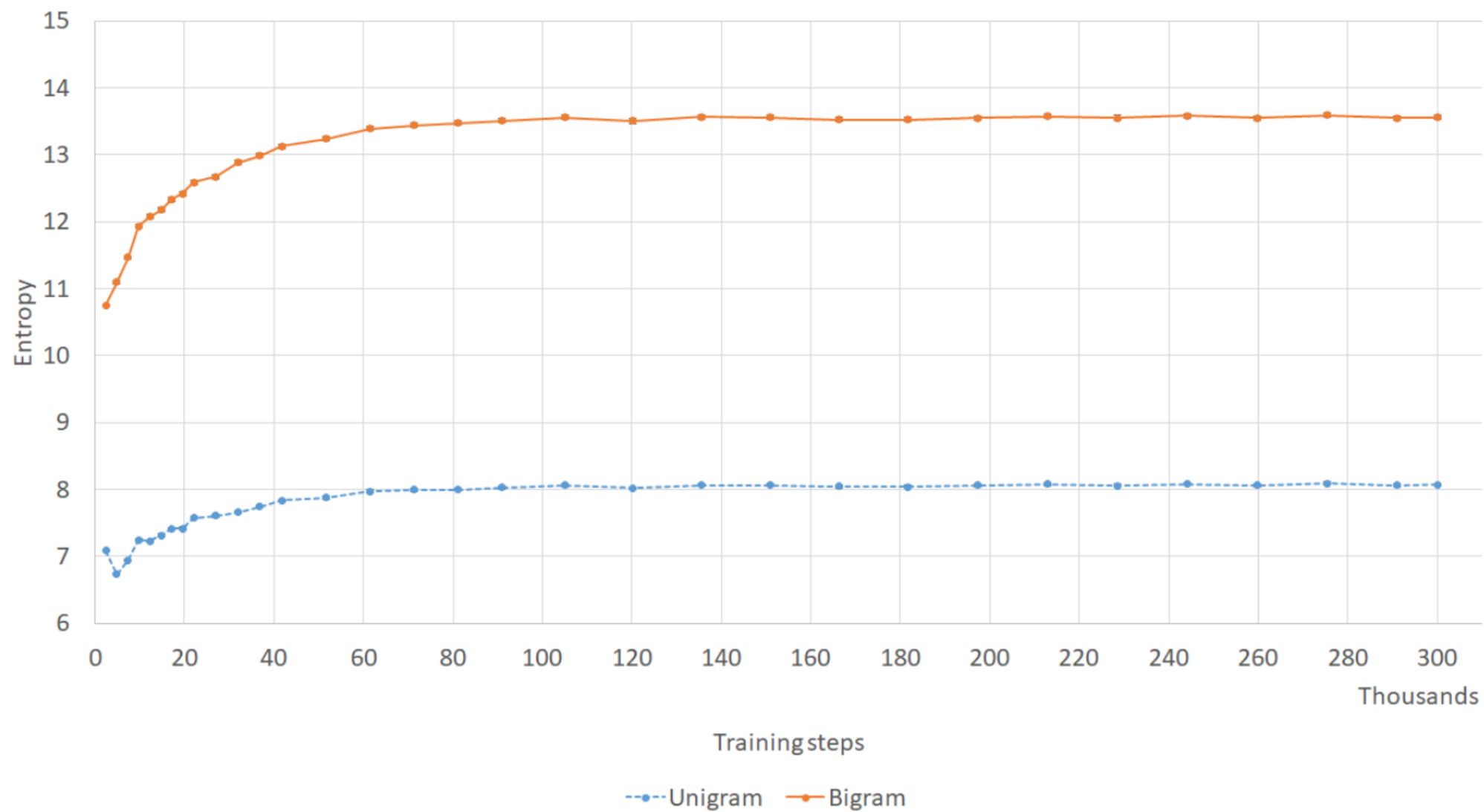
Issues: Loss function

- ▶ Single-turn enc-dec architectures generate boring/generic responses
- ▶ One-to-many
 - ▶ How are you?
- ▶ Many-to-one
 - ▶ I don't know?
- ▶ Model doesn't perform best at validation loss minimum

Issues: Metrics



Issues: Metrics



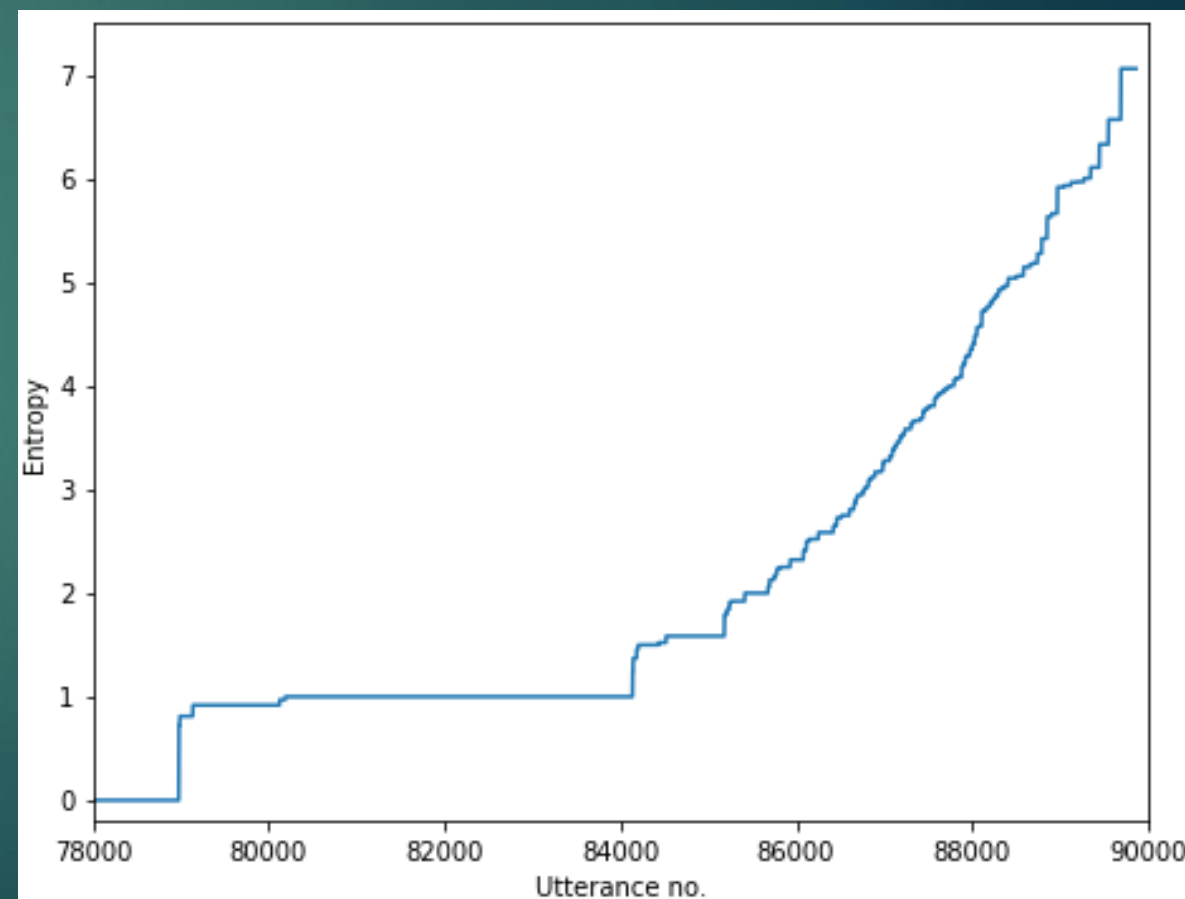
Ideas: Filtering based on entropy

<https://arxiv.org/abs/1905.05471>

- ▶ Remove problematic sentences from the dataset
 - ▶ One-to-many, many-to-one
- ▶ Entropy

$$H_{\text{src}}(t, D) = - \sum_{(s_i, t) \in D} p(s_i | t) \log_2 p(s_i | t)$$

$$H_{\text{tgt}}(s, D) = - \sum_{(s, t_i) \in D} p(t_i | s) \log_2 p(t_i | s)$$

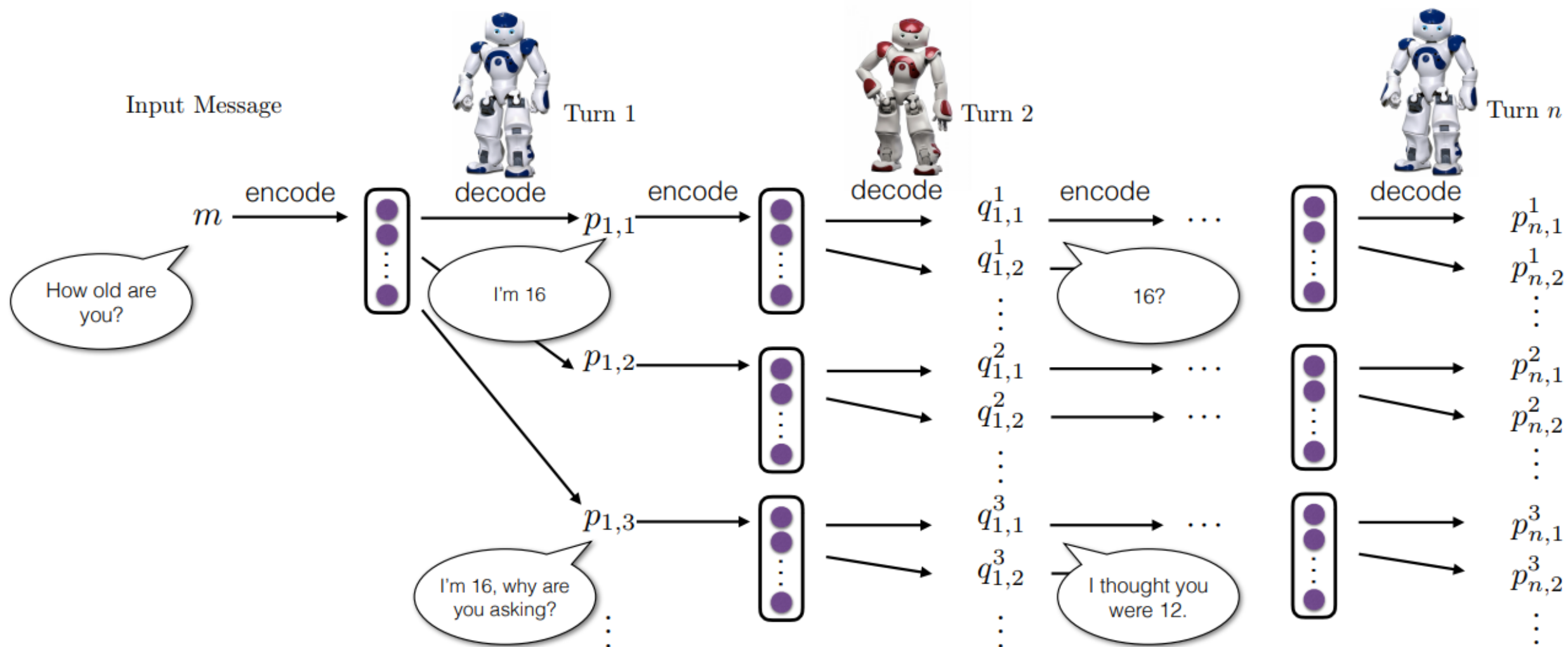


Ideas: Features

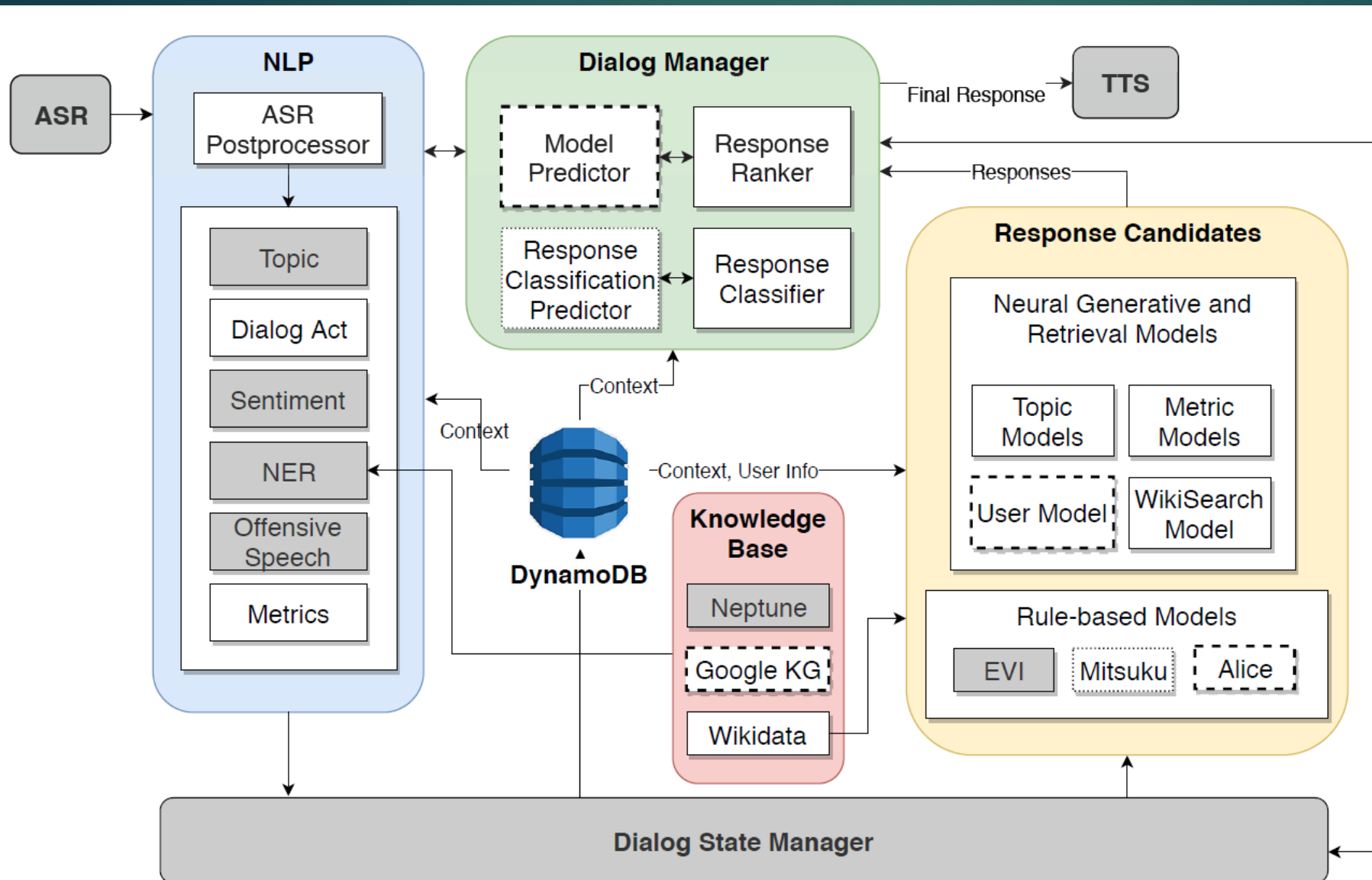


Ideas: self-play

<https://arxiv.org/pdf/1606.01541.pdf>



Amazon Alexa: A dialog system



Köszönöm a figyelmet!

- ▶ <https://github.com/ricsinaruto/Seq2seqChatbots/tree/master/docs/meetup>
 - ▶ Slide-ok és ParlAI tutorial