RUCIR at NTCIR-14 STC-3 CECG Subtask

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STC-3 CECG @ NTCIR-14

Conversation Generation Task

- **Input:** post $(X = x_1 x_2 \cdots x_n)$
- **Output:** response *(with fluency and coherence)*

Post (Given)	Response (to be Generated)
爱狗还会做饭的男人，最帅了! The man who cooks and loves dogs is very handsome!	会做饭的男人是很帅的啊。 The man who cooks is handsome.

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Not Consider Emotion (Important in Conversation)

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Emotional Conversation Generation

- **Input:** post & emotion category (of response)
  {Like, Happiness, Anger, Disgust, Sadness, Other}
- **Output:** response *(with fluency and coherence & emotional consistency)*

Post (Given)	Emotion (Given)	Response (to be Generated)
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Goal: Generate the Response with Special Emotion

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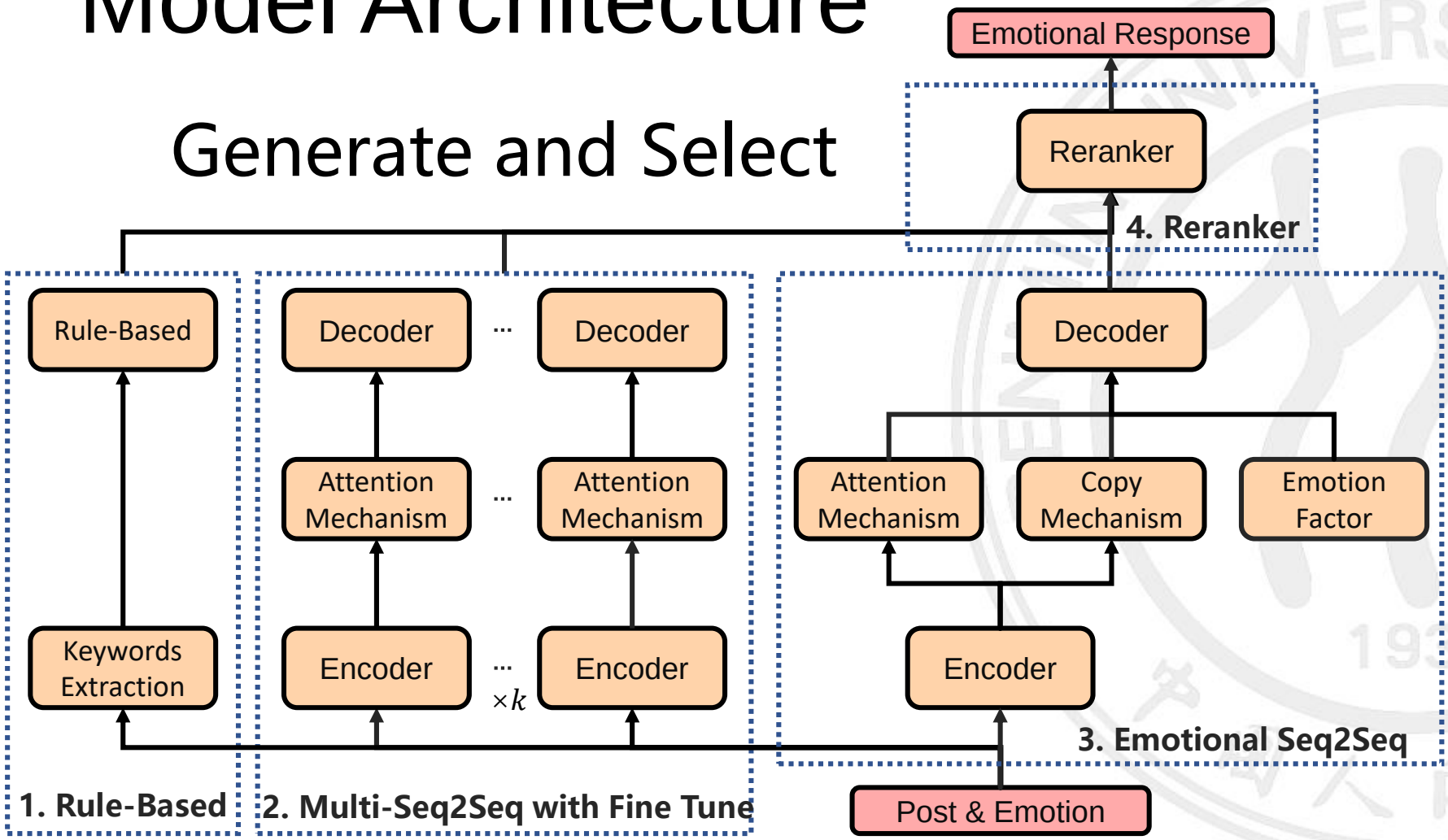
Same Post: Different Response with Different Emotion

Post (Given)	Emotion (Given)	Response (to be Generated)
爱狗还会做饭的男人，最帅了！ The man who cooks and loves dogs is very handsome!	喜欢 Like	会做饭的男人是很帅的啊。 The man who cooks is handsome.
爱狗还会做饭的男人，最帅了！ The man who cooks and loves dogs is very handsome!	厌恶 Disgust	但是我真的讨厌这样的男人！ But I really hate such a man!
爱狗还会做饭的男人，最帅了！ The man who cooks and loves dogs is very handsome!	悲伤 Sadness	好伤心，我没遇到过这样的男人。 So sad, I have never met such a man.

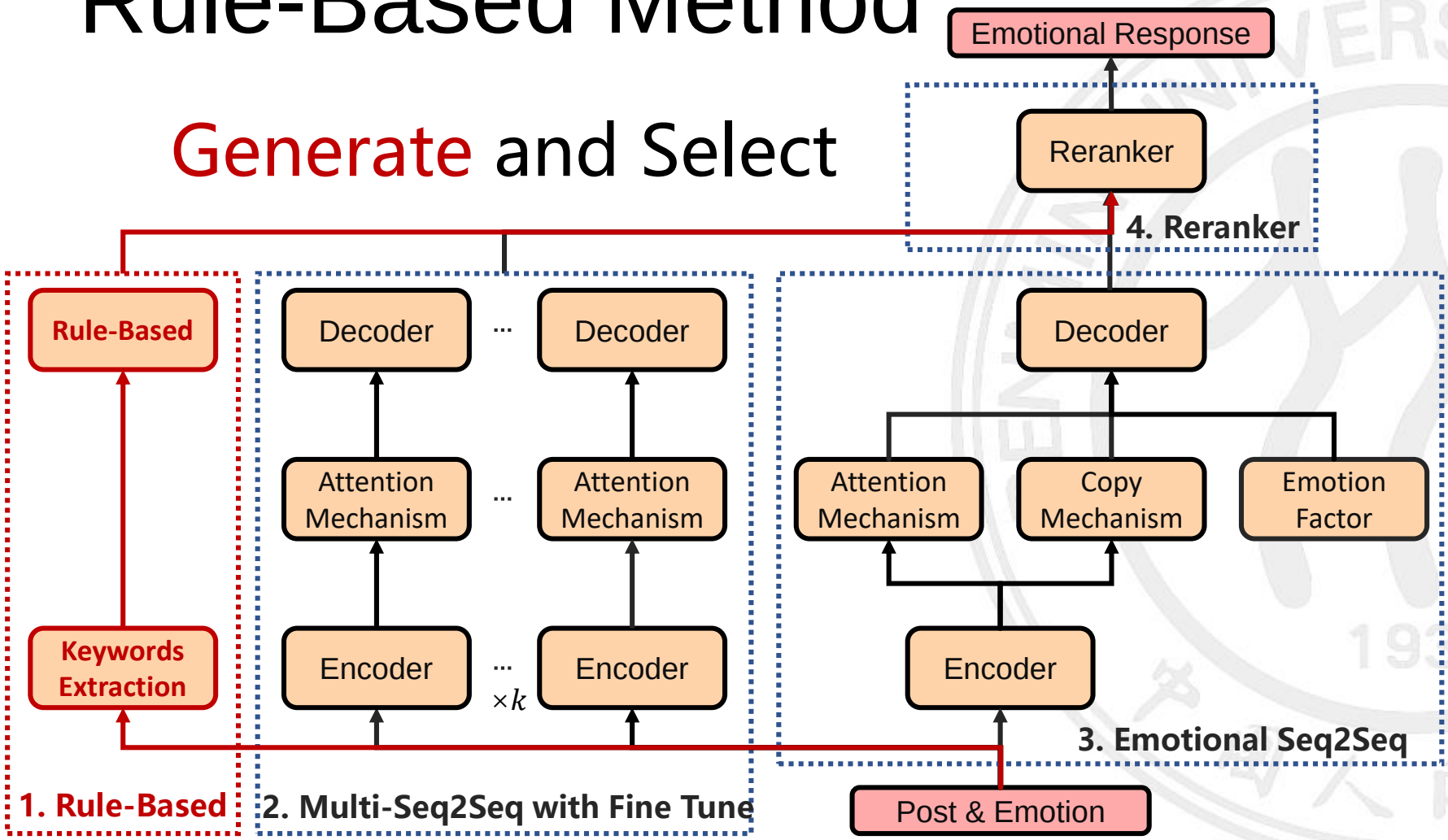
Model Architecture

Generate and Select



Rule-Based Method

Generate and Select



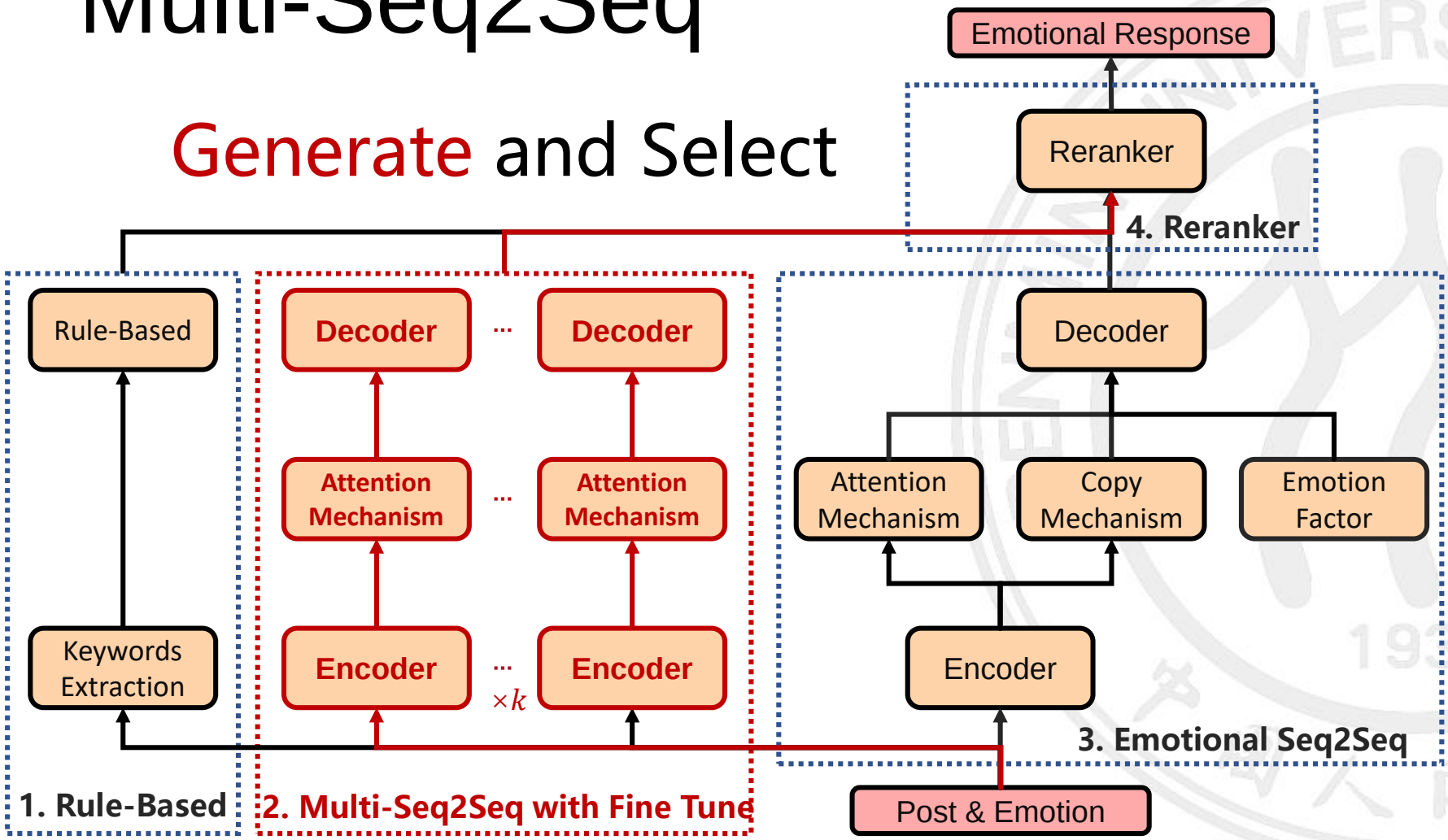
Rule-Based Method

- Extract the Keyword in the Post (based on NER)
- Fill it into the Proper Constructed Template

Post	海南游是破灭了[怒][怒][怒] **Hainan tour is ruined [angry] [angry] [angry]**
喜欢 Like	最喜欢 海南 了 I like Hainan most.
高兴 Happiness	想到 海南 就很开心 I am very happy when I think of Hainan .
生气 Anger	不想听到 海南，别跟我提! I don’t want to hear about Hainan , don't mention it to me!
厌恶 Disgust	超级不喜欢 海南 ! Super dislike Hainan !
悲伤 Sadness	海南 伤透了我的心 Hainan broke my heart

Multi-Seq2Seq

Generate and Select



Seq2Seq with Attention

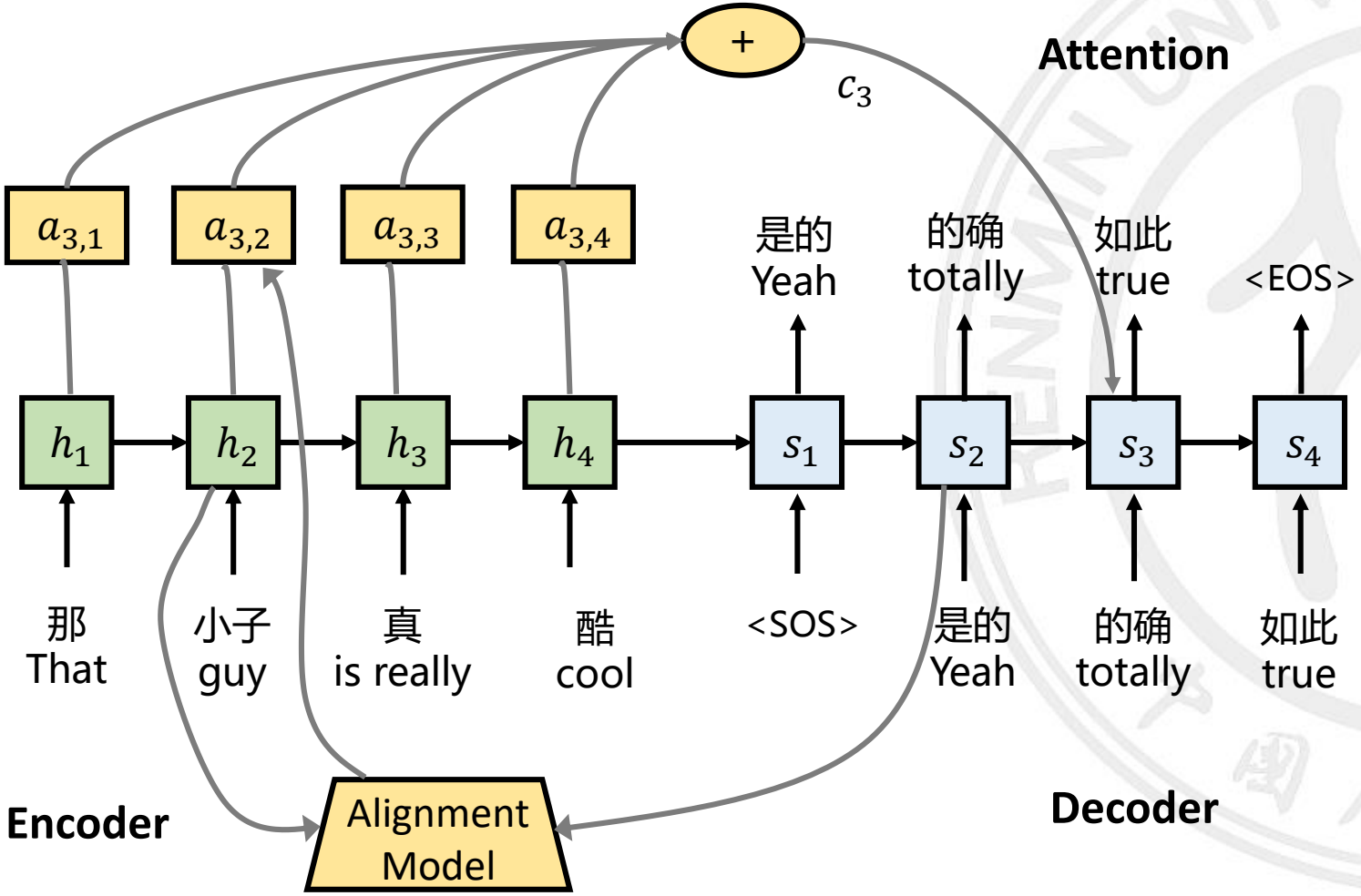
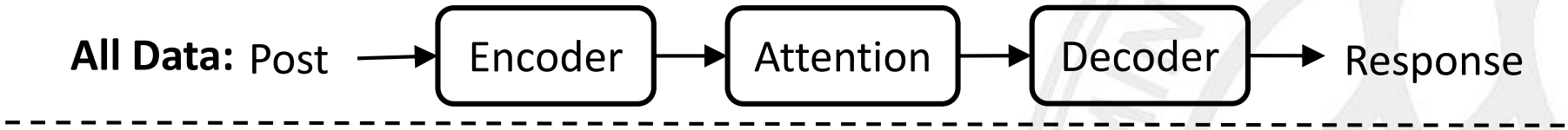


Image Reference: Qiu et al., 2017. Alime chat: A sequence to sequence and rerank based chatbot engine. ACL 2017.

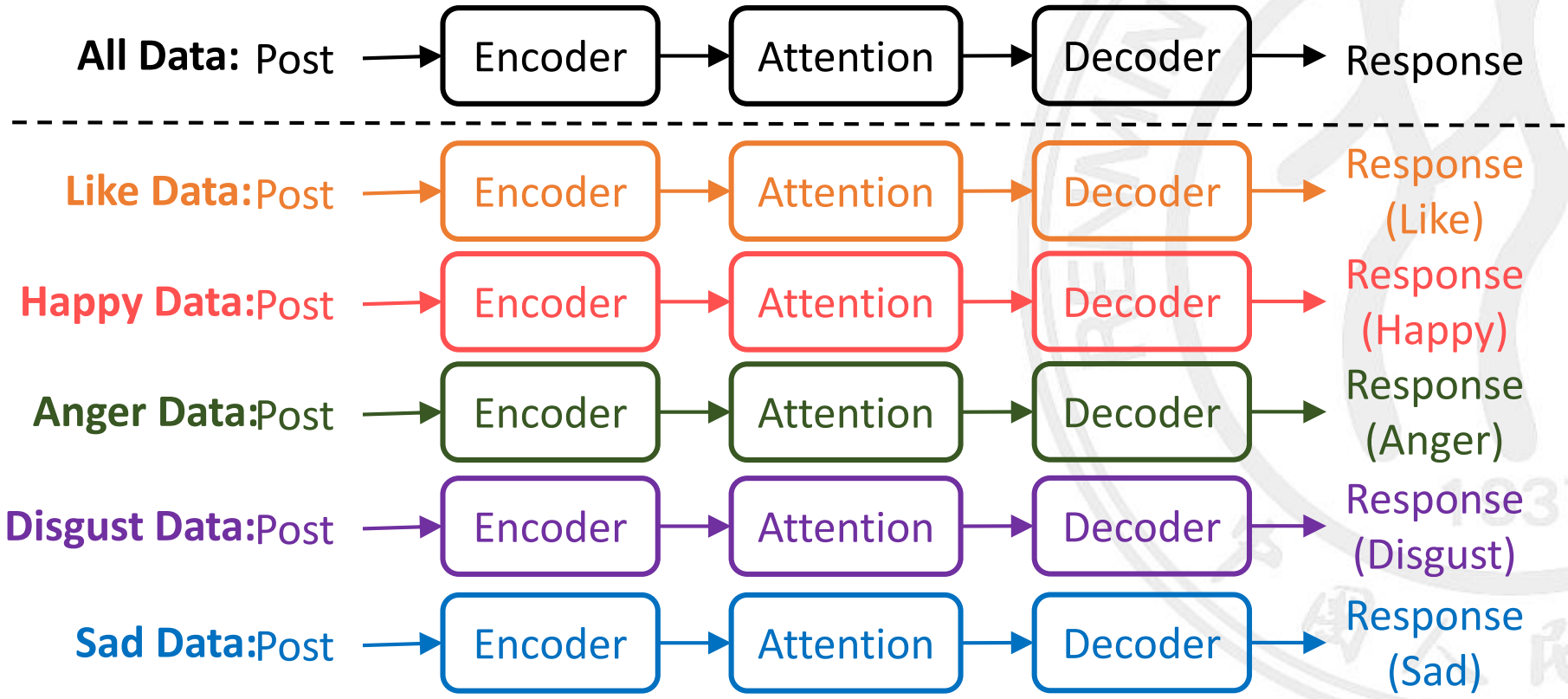
Multi-Seq2Seq with Fine Tune

- Train Different Seq2Seq Models for Different Emotions



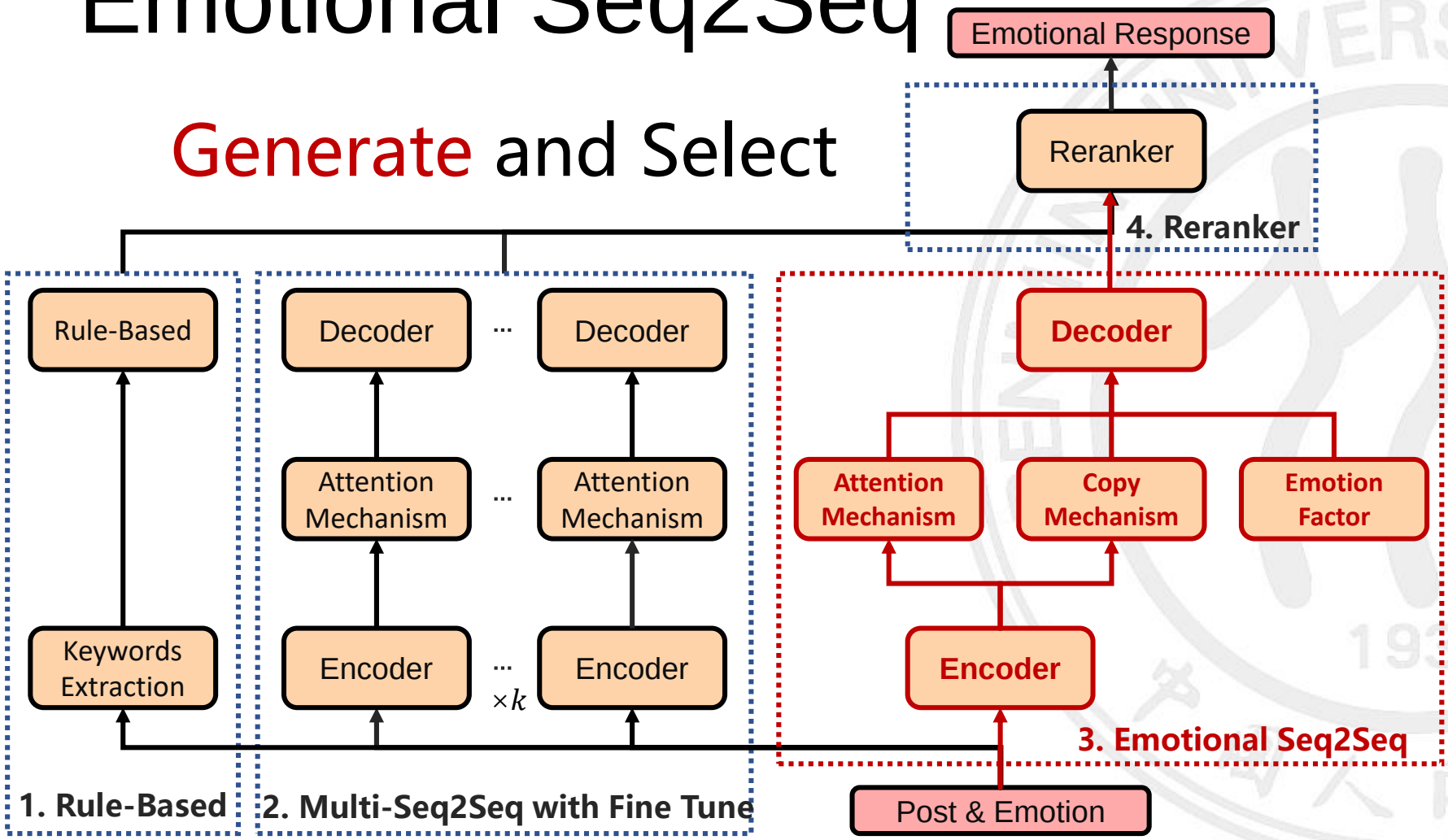
Multi-Seq2Seq with Fine Tune

- Multi-Seq2Seq: One Model for One Emotion Category



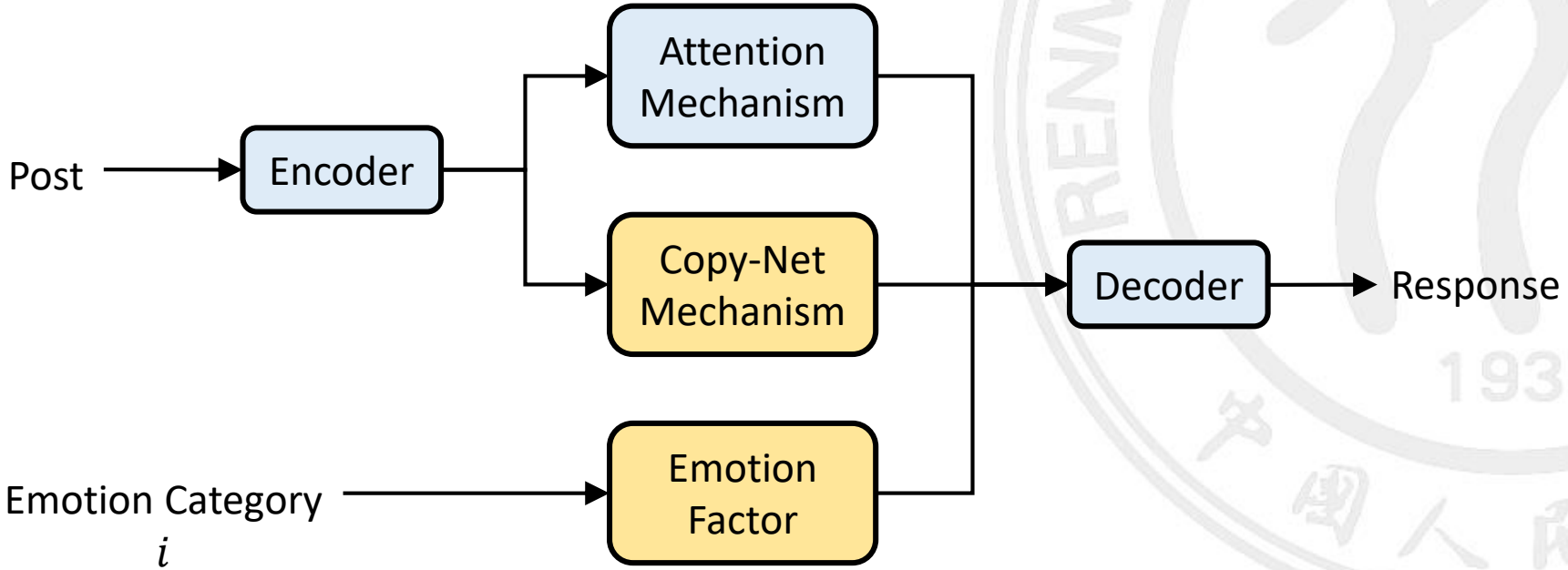
Emotional Seq2Seq

Generate and Select



Emotional Seq2Seq

- Idea: Increase the Probability of Emotional Words
- Emotional Seq2Seq: One Model for Many Emotion Categories

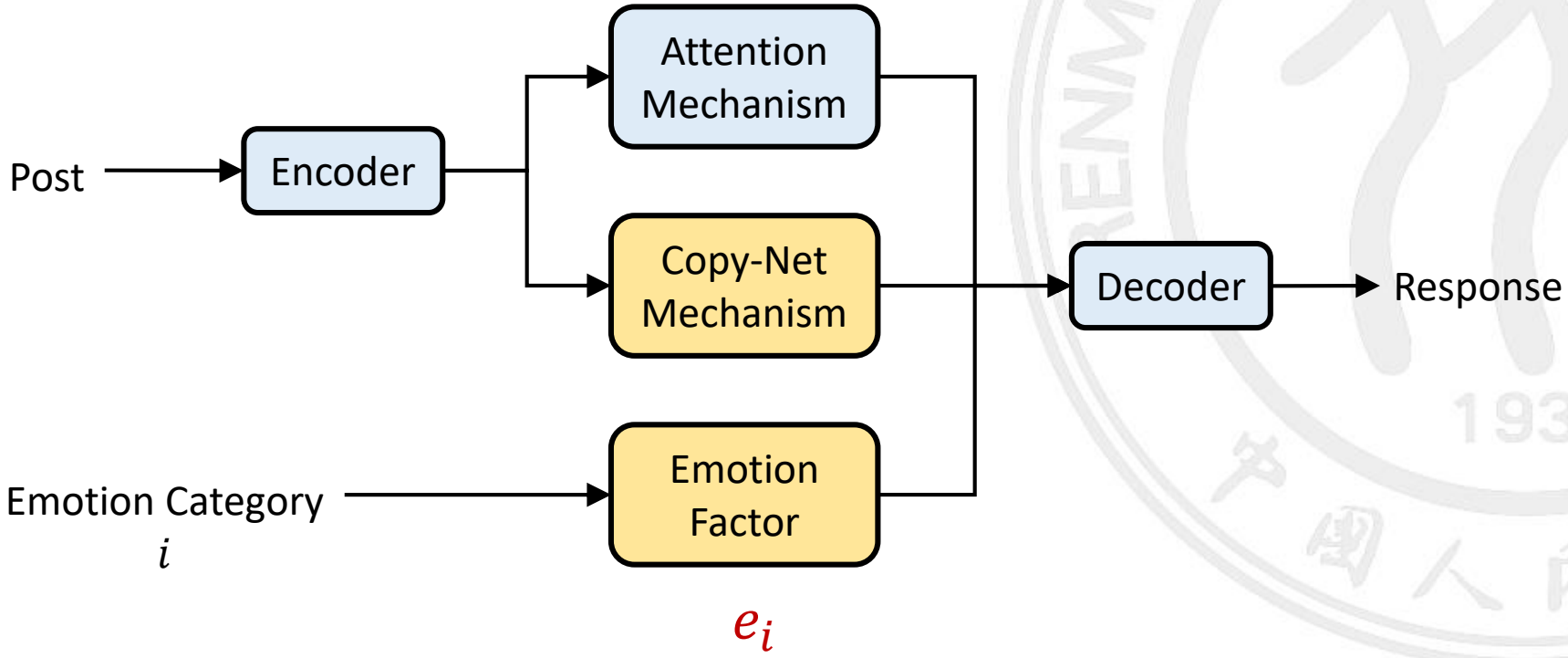


Reference: Zhou et al., 2018. Emotional chatting machine: Emotional conversation generation with internal and external memory. AAAI 2018.

Emotional Seq2Seq

- Implicit Method: Emotion Factor by Emotion Embedding (e_i)

$$s_t = \mathrm{GRU}_{\mathrm{decoder}}(s_{t-1}; [y_{t-1}, c_t, e_i])$$



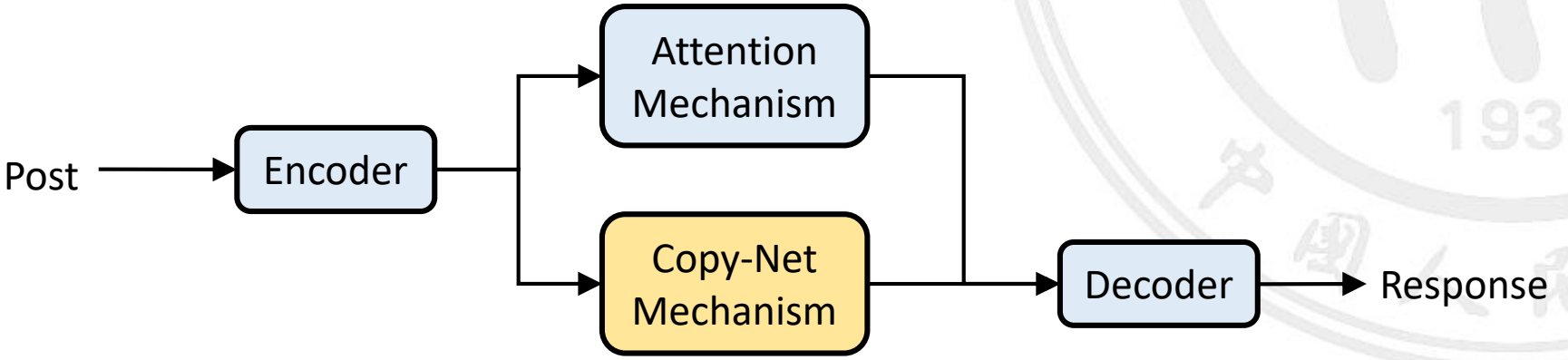
Reference: Zhou et al., 2018. Emotional chatting machine: Emotional conversation generation with internal and external memory. AAAI 2018.

Emotional Seq2Seq

- Explicit Method: Adding Copy Probability of Emotional Word in Emotional Dictionary (E) Built by Clustering

$$P(y_t|s_t) = P_{ori}(y_t|s_t) + P_{emo}(y_t|s_t, E)$$

$$P_{emo}(y_t|s_t, E) = \begin{cases} 0, & non\text{-}emotional\ word \\ \mathrm{softmax}(EW_e s_t), & emotional\ word \end{cases}$$



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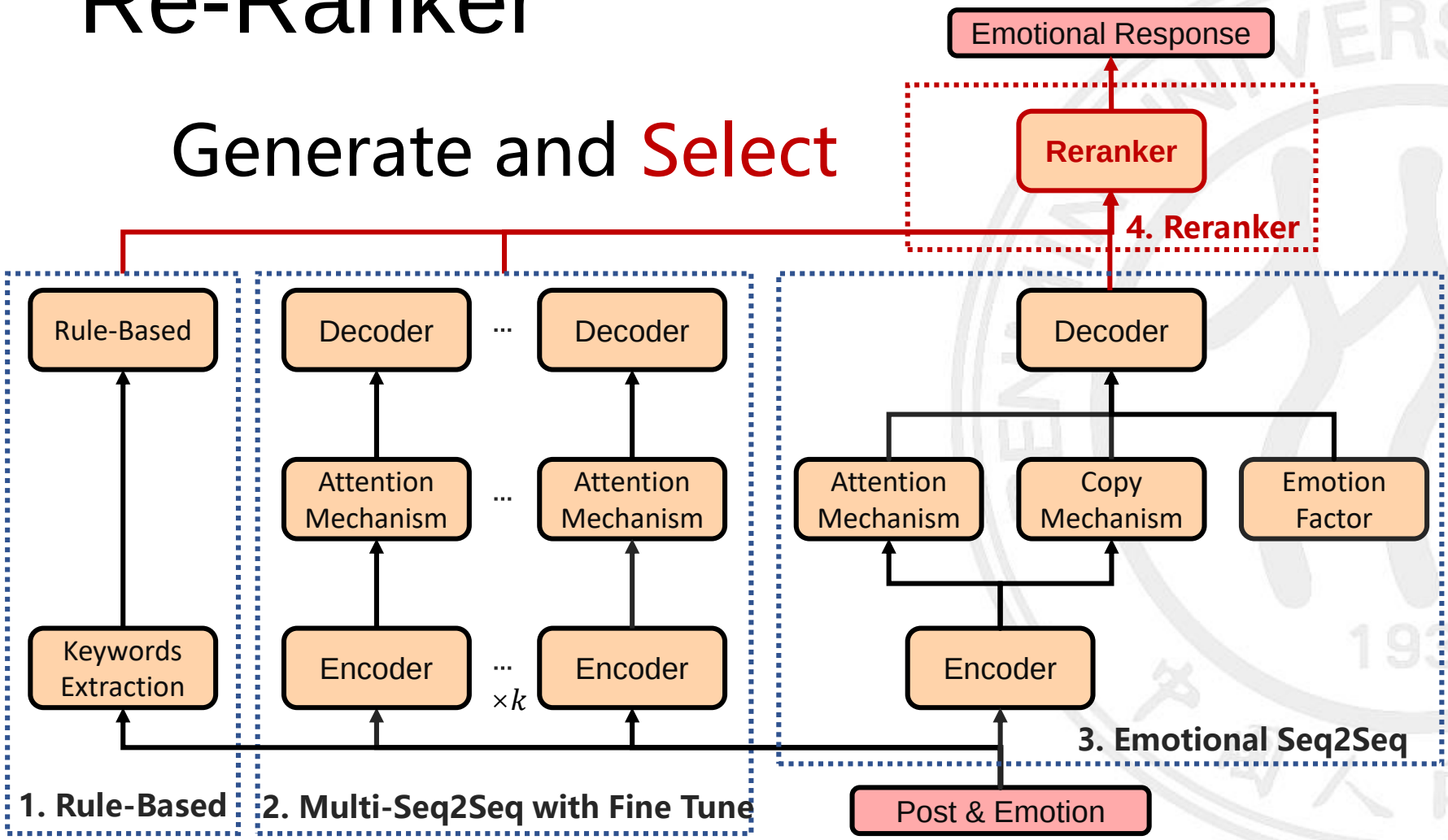
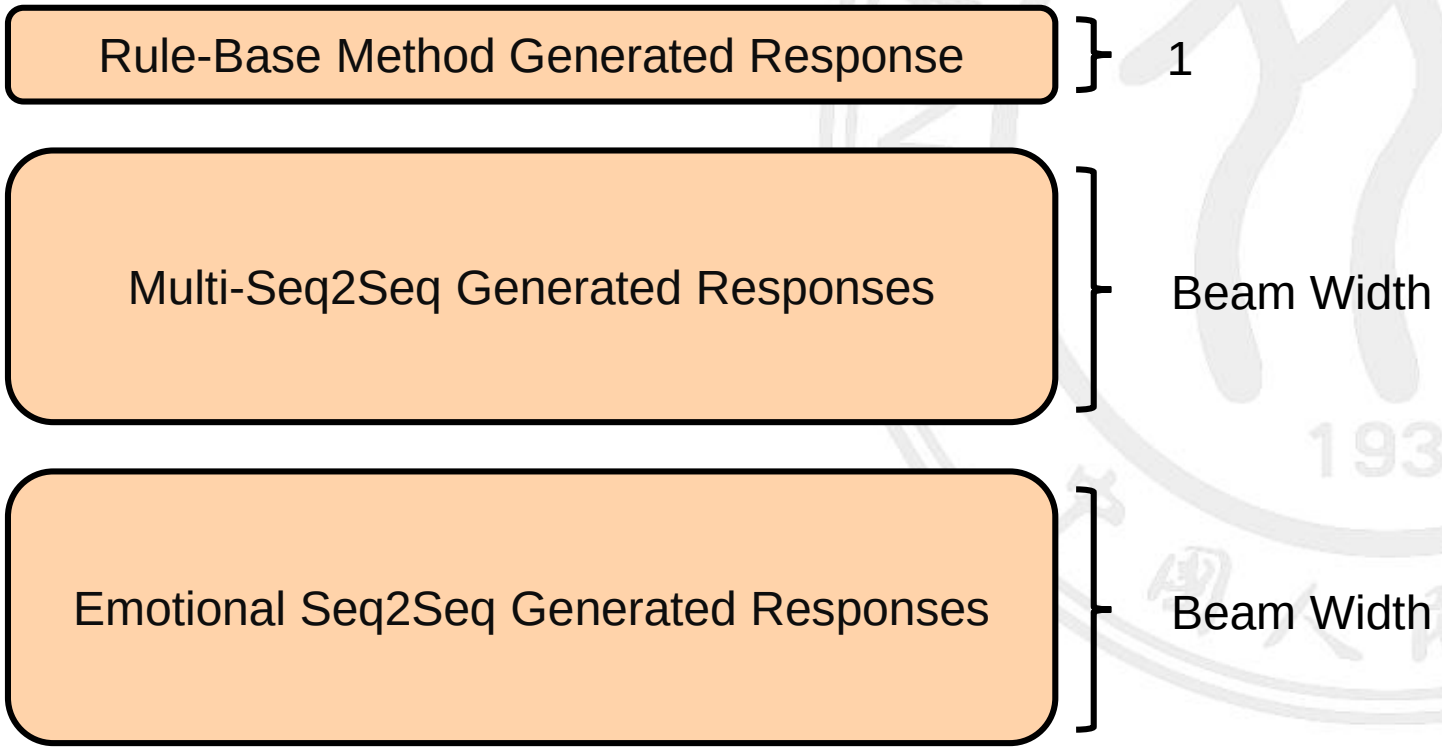
Re-Ranker

Generate and Select



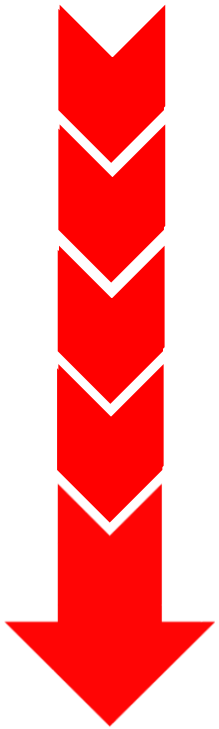
Re-Ranker

- Given the Response Set: How to select the Best Response?



Re-Ranker

- Given the Response Set: How to select the Best Response?
- Metrics: Emotional Consistency & Coherence & Fluency
- Rank by Metrics: Emotion Score + Coherence Score



Rule-Base Method Generated Response — 1

Multi-Seq2Seq Generated Responses — Beam Width

Ranked by Generated Probability

Emotional Seq2Seq Generated Responses — Beam Width

Re-Ranker

- Emotion Score based on Emotional Dictionary
  - Explicit Emotional Word: High Score
  - Implicit Emotional Word: Low Score
  - Degree Word (e.g., very, a little, not) :
  - Strengthen or Weaken or Reverse Emotion Score

Post	你看上去不太好。 You don't look very good.
悲伤 Sadness	我昨晚失眠了。 I lost sleep last night. ☹
悲伤 Sadness	昨晚失眠了，我好难过。 I was so sad about insomnia last night. ☺

Dictionary Reference: 徐琳宏, 林鸿飞, 潘宇, 任惠, 陈建美: 情感词汇本体的构造. 情报学报 27(2), 180–185 (2008).

Re-Ranker

- Coherence Score
- The Term Similarity between Response and Post
- Count the Number of Same Term (to be improved)

Post	我获奖了。 I won the prize.	
高兴 Happiness	我为你感到很开心。 I am so happy for you.	☹
高兴 Happiness	我为你获奖而感到开心。 I am very happy that you won the prize.	☺

Data Description

The dataset (from weibo) looks like:

[[[post,post_label],[response,response_label]],
[[post,post_label],[response,response_label]], ...].

Emotion Label

0: Other; 1: Like; 2: Sadness;

3: Disgust; 4: Anger; 5: Happiness

Training Set: 1.5M+

Dev Set & Test Set: 5000

Final Submit Set: 200

Data Source: Hosted by Prof. Minlie Huang, AI lab. of Computer Science, Tsinghua University, Beijing 100084, China.

Data Preprocessing

- **Token-level Data Pre-processing**

  - Emoji (e.g., “[angry]” (“[怒]”)): remove
  - Kaomoji (e.g., “ヽ(^∀^)ノ”): remove
  - Mention and repost characters (i.e., “@” or “//@”): remove
  - Meaningless beginning of sentence (e.g., “Yes” (“嗯嗯”)): remove
  - Dialect (e.g., Cantonese): translate to Mandarin
  - Online buzzwords (e.g., “肿么了”, “神马”): translate to Mandarin
  - Repeated expressions (e.g., “Hahahahahah”): simplify (e.g., “Haha”)

- **Sentence-level Data Pre-processing**

  - High-frequency response (e.g., “What’s up” (“怎么了”)): delete
  - Post-response pairs that are not Chinese or too short: delete

Evaluation Metric

Post: 爱狗还会做饭的男人，最帅了!
The man who cooks and loves dogs is very handsome!

Emotion	Response	Coherence and Fluency	Emotion Consistency	**Label**
喜欢 Like	会做饭的男人是很帅的啊。 The man who cooks is handsome.	Yes	Yes	**2**
喜欢 Like	是的，我也觉得。 Yes, I feel the same way.	Yes	No	**1**
喜欢 Like	这是同主义同的道! This is the same way of the same doctrine!	No	No	**0**

Experiment Result

Team Name	Label 0	Label 1	Label 2	Total	Overall Score	Average Score
1191_1	581	320	99	1,000	518	0.518
1191_2	831	109	60	1,000	229	0.229
AINTPU_1	716	200	84	1,000	367	0.336
CKIP_1	845	29	126	1,000	281	0.281
CKIP_2	840	28	132	1,000	292	0.292
IMTKU_1	580	248	172	1,000	592	0.592
IMTKU_2	954	32	14	1,000	60	0.060
TMUNLP_1	777	126	97	1,000	320	0.320
TUA1_1	443	293	264	1,000	821	0.821
TUA1_2	454	278	268	1,000	814	0.814
WUST_1	601	211	188	1,000	587	0.587
WUST_2	999	0	1	1,000	2	0.002
TKUIM_2	507	260	233	1,000	726	0.726
RUCIR_1	392	263	**345**	1,000	**953**	**0.953**
RUCIR_2	460	**342**	198	1,000	738	0.738

Experiment Result

Emotion Category	Team Name	Label 0	Label 1	Label 2	Overall Score	Average Score
Like	RUCIR_1	88	36	76	**188**	**0.940**
	RUCIR_2	96	44	60	164	0.820
	TKUIM_2	90	56	54	164	0.820
Sad	RUCIR_1	72	48	80	**208**	**1.040**
	TUA1_1	84	31	85	201	1.005
	RUCIR_2	83	57	60	177	0.885
Disgust	RUCIR_1	71	76	53	**182**	**0.910**
	TUA1_2	92	82	26	134	0.670
	TUA1_1	82	105	13	131	0.655
Anger	RUCIR_1	88	63	49	**161**	**0.805**
	TKUIM_2	112	45	43	131	0.655
	TUA1_2	85	107	8	123	0.615
Happy	TUA1_2	76	25	99	223	1.115
	TUA1_1	71	36	93	222	1.110
	RUCIR_1	73	40	87	214	1.070

Thanks

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