

Conversation Model Fine-Tuning for Classifying Client Utterances in Counseling Dialogues

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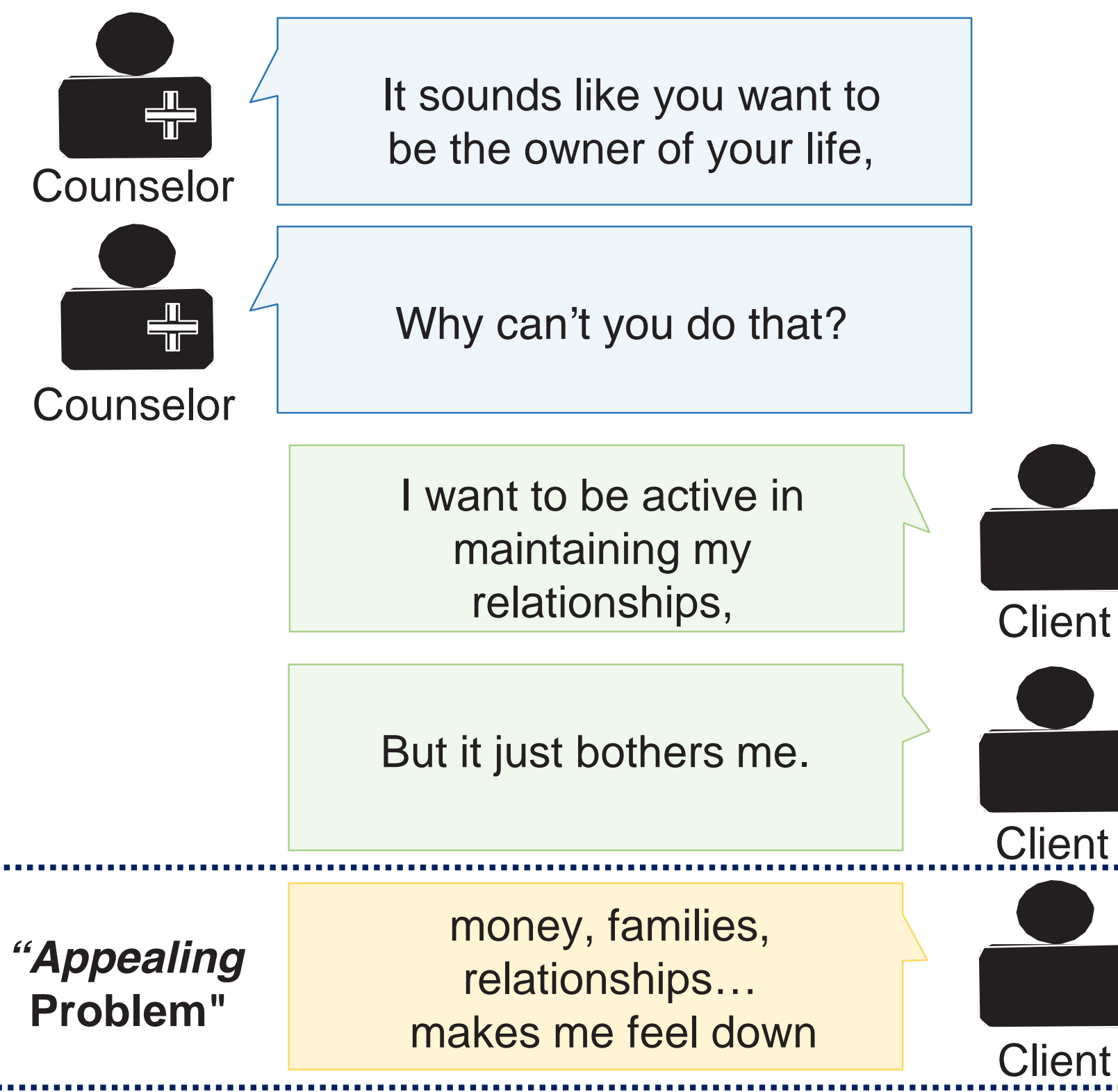
Background



- In text-based online counseling, client's utterances are crucial factors for judging the counseling outcome and for understanding the status of the client.
- So we apply computational approach to analyze client utterances from the *counselor's perspective*.

① Text-based Online Counseling Dialogues

- Distinctive roles of speakers
- Multiple utterances in a turn



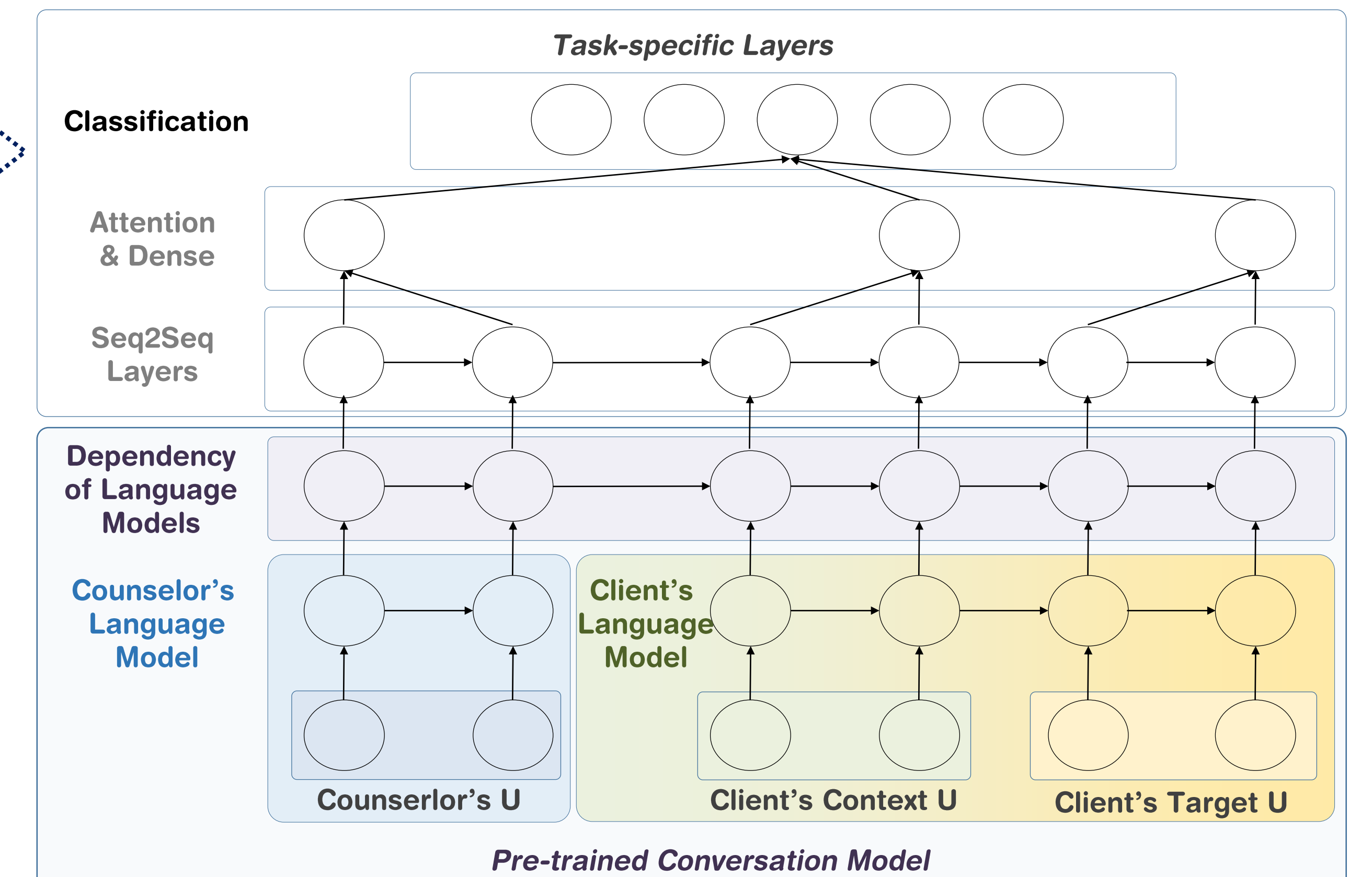
② Categorize Client's Utterances

- Suitable for the text-only environment
- Available as a labeling scheme
- Meaningful to counselors

- Factual Information
- Anecdotal Experience
- Appealing Problems
- Psychological Change
- Counseling Process

③ Predict Categories of Client's Utterances

Model : ConvMFiT (Conversation Model Fine-Tuning)



Contribution

- Build a novel categorization method as a labeling scheme for client utterances in text-based counseling dialogues.
- Propose Conversation Model Fine-Tuning (ConvMFiT) to classify the utterances. The model outperforms other models including a state-of-the-art neural network text classification model.

Dataset

- 100 labeled dialogues out of 1,448 total dialogues (anonymized)
- Extract 21,100 triples (counselor's utterance, client's context utterance, client's target utterance) from labeled dialogues
- Split triples into train, validation, test set (7 : 1.5 : 1.5)

Categorization of Client's Utterances

Characteristic	Informative		Client Factors		Process
Category Name	Factual Information (Fact.)	Anecdotal Experience (Anec.)	Appealing Problem (Prob.)	Psychological Change (Chan.)	Counseling Process (Proc.)
Explanation	Brief mention of categorical information	Clients experience contributing to the appealing problem	Clients factors related to the appealing problem	Statement at the resolution stage of the appealing problem	Statement of counseling structure and relationship
Example	<ul style="list-style-type: none">Objective factLiving conditionsDemographic informationLimited conditions	<ul style="list-style-type: none">Experience with othersComments from othersTraumaInterpersonal situations	<ul style="list-style-type: none">Negative EmotionCognitive distortionInterpersonal problemsFamily problems	<ul style="list-style-type: none">Positive predictionExpectation, DeterminationCoping behaviorsSelf-awareness	<ul style="list-style-type: none">A message to counselorGratitude, GreetingsTime appointmentQuestions about the counseling

- 10 cases randomly sampled, considering demographic variables
- 2 professional counselors iterate categories based on Consensual Qualitative Research method
- 1st round : [Events, Thoughts, Emotions, Behavior] + @
- 2nd round : [Factual Information, Anecdotal Experience, Appealing Problem, Psychological Change, Counseling Process]
- Other 5 counselors annotated client's utterances using the categories

Classification Performance

No.	Dep.	Model	F1 (Fact.)	F1 (Anec.)	F1 (Prob.)	F1 (Chan.)	F1 (Proc.)	Macro Prec.	Macro Rec.	Macro F1
1	X	RF	0.000	0.564	0.420	0.000	0.723	0.476	0.269	0.341
2	X	SVM(rbf)	0.012	0.683	0.457	0.000	0.766	0.602	0.385	0.384
3	X	CNN	0.211	0.528	0.506	0.128	0.706	0.450	0.397	0.416
4	X	RNN	0.193	0.574	0.570	0.046	0.770	0.607	0.375	0.431
5	X	ULMFiT	0.205	0.641	0.591	0.057	0.784	0.613	0.413	0.455
6	O	Seq2Seq	0.263	0.662	0.678	0.226	0.823	0.695	0.472	0.530
7	O	HRED	0.261	0.706	0.675	0.193	0.820	0.680	0.475	0.531
8	O	ConvMFiT	0.441	0.761	0.726	0.447	0.835	0.716	0.602	0.642

Conclusion

- We develop 5 categories of client utterances, and ConvMFiT for classifying them into the categories by leveraging a pre-trained conversation model.
- We plan to apply our trained model to various text-based psychotherapy applications, such as extracting and summarizing counseling dialogues.
- We hope our categorization scheme and our ConvMFiT model become a stepping stone for future computational psychotherapy research.

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