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Analyzing the Language of Therapist Empathy in Motivational Interview based Psychotherapy

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Outline

- Introduction
 - What is empathy? what is Motivational Interview?
 - Why do we want to study empathy? How do we capture?
- Datasets
 - What kind of data we use? Why MISC + MITI?
- Language Model
 - What method we use to model empathy?
 - How to fuse local instances to infer global rating?
- Experiments
- Discussion
- Conclusion

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Introduction --- Empathy

- What is empathy
 - A natural human ability
 - Feeling for and taking the perspective of others
- Why is empathy important to study
 - The other party feels acknowledged
 - Better and more efficient communication
 - Important skill, a quality index in psychotherapy



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Introduction --- MI

- The spirit of Motivational Interview
 - Client's own will of making a change
 - Therapist: understand, facilitate, no dictate
- The practice of Motivational Interview
 - Intervention of substance use
 - In college and community
 - Audio-visual recorded interactions for research

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Introduction --- Capture

- Traditional method
 - Systematically design coding manuals
 - Train coders to review and judge
- New method
 - Automatic analysis through BSP --- behavioral signal processing
 - Advantage: scalability, new dimensions
 - In particular, with the cues of language use

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USC Datasets --- MISC + MITI **SAIL**

- Use manual transcripts
- Motivational Interviewing Skill Code (MISC)
- Motivational Interviewing Treatment Integrity (MITI)
- Learn the language model on MISC set
- Apply it to MITI set to correlate with global rating

Dataset	Unit	Ratings
MISC	Utterance	Empathic: 854
		Non-empathic (background): 6439
MITI	Sessions	Empathy rating on 1-7 likert scale 88 sessions, 97% in the 4-6 range

USC Datasets -- Example **SAIL**

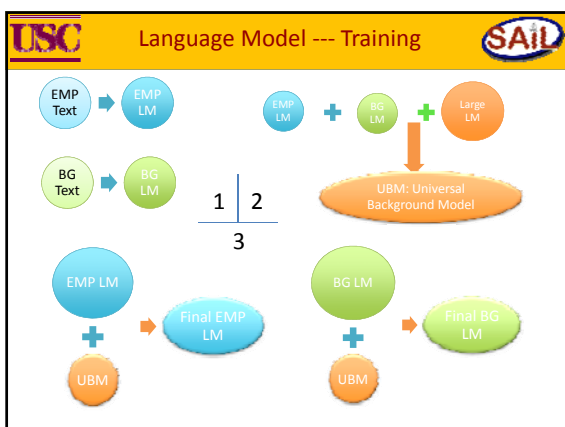
- Therapist: *Yeah. So it sounds like the drug's really helpful in terms of kinda; you stress out wondering what's going on with my body and it puts you in a better frame of mind.*
- Client: {Mm-hmm.} Yeah. I'm it's hard for me to fall in sleep.
- Therapist: Okay.

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USC Language Model --- Max. Likelihood **SAIL**

- N-gram model
- Empathy (EMP) and Background (BG) sets disjoint, small in size
- Adopt a large size LM to construct a UBM
- Mixing weight
 - λ_1 in constructing UBM
 - λ_2 in mixing with Emp and Bg
- Obtain $P(\text{utterance} | \text{EMP})$ and $P(\text{utterance} | \text{BG})$



USC Language Model --- Features **SAIL**

- Goal: correlate utterance level language modeling to session level empathy score
- Threshold: count salient empathic utterances

F1	Sum of soft decisions $d = \log P(\text{utterance} \text{EMP}) - \log P(\text{utterance} \text{BG})$ $F1 = \text{sum}(d)$
F2	Count hard decisions per utterance $F2 = \{\text{utterances} d > 0\} $
F3	Count hard decisions per utterance with optimized priors $F3 = \{\text{utterances} d > \delta\} $

USC Language Model --- Feature **SAIL**

- Goal: correlate utterance level language modeling to session level empathy score
- Threshold: count salient empathic utterances

F4	Ratio of counts of hard decisions as per F3
	$F4 = \frac{ \{ utterances \mid d > \delta \} }{ \{ utterances \} }$
F5	As per F3 but weighing by utterance length
	$F5 = \frac{ \{ utterances \mid d > \delta * utterance_length \} }{ \{ utterances \} }$
F6	As per F4 but weighing by utterance length
	$F4 = \frac{ \{ utterances \mid d > \delta * utterance_length \} }{ \{ utterances \} }$

USC Language Model --- Threshold **SAIL**

- Threshold \rightarrow saliency: $P(U|EMP) \gg P(U|BG)$
- δ bounded by $\text{Max}(\log P(U|EMP) - \log P(U|BG))$
- Search for δ^* that maximize the correlation of the features and MITI empathy score

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USC Experiments --- Utterance **SAIL**

- Empathic / Non-empathic utterance classification
- 5-fold cross validation

- Uni-gram high in recall low in precision
- In average bi-gram performs better

USC Experiments --- Session **SAIL**

Feature	Correlation	p-value
f1	-0.11	0.3
f2	0.35	1e-3
f3	0.41	8e-5
f4	0.43	3e-5
f5	0.40	1e-4
f6	0.43	2e-5
f1..f6	0.56	2e-8
f3..f6	0.50	1e-6

- Leave one out cross-validation on regression: feature to empathy score
- Significant correlation

Fig. 2. Feature f_3 and session level empathy score Y

- Higher scored sessions tend to be on the right side

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USC Discussion --- Word use **SAIL**

- Discriminative power of word
- $D(w) = (\log P(w|EMP) - \log P(w|BG)) * \text{occurrence}(w)$
- High: second person pronouns, reflective listening
- Low: first, third person pronouns, following-neutral

High empathy word	Low empathy word
you're you it like sounds so and you've your of that to it's a with kind not really for kinda time friends maybe	they mm-hmm what we alcohol this yeah think about okay drinks right if do is that's they're b_a_c us um-hum

USC Discussion --- Saliency, etc. **SAIL**

- Feature f1 does not work, f3 --- f6 works better
- Salient events lead to judgment rather than accumulation of every instance
- Limitation: Background utterances are not un-empathic

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USC Conclusion and future work **SAIL**

- Computational language modeling provides useful insights into the expressed empathy behavior of therapists
- Future work
 - Empathy in a context: consider client language
 - Locate reflection: empathy closely related to reflective listening
 - Multimodal: acoustic, facial, gesture

USC Thank you! **SAIL**

- Questions & Answer