Found in Translation:

Learning Robust Joint Representations by Cyclic Translations Between Modalities

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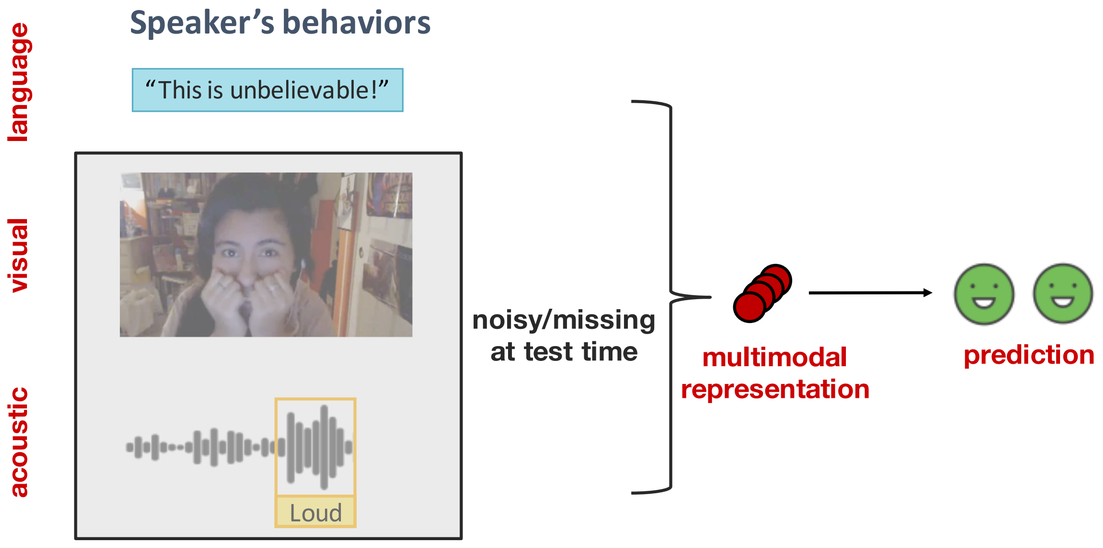
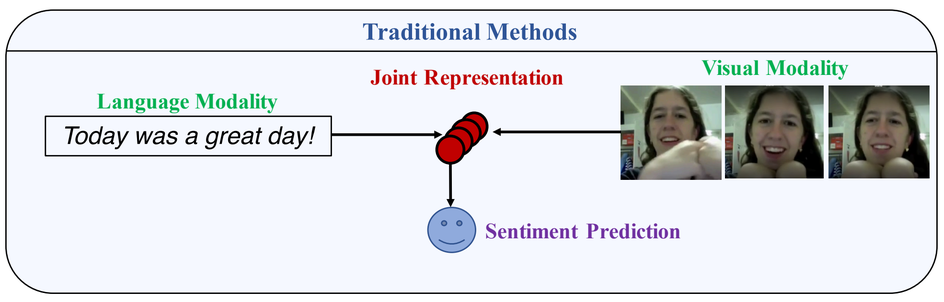
OVERVIEW

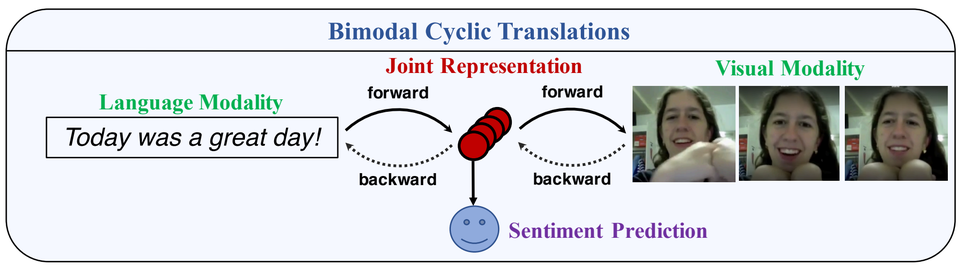


- Traditional approaches



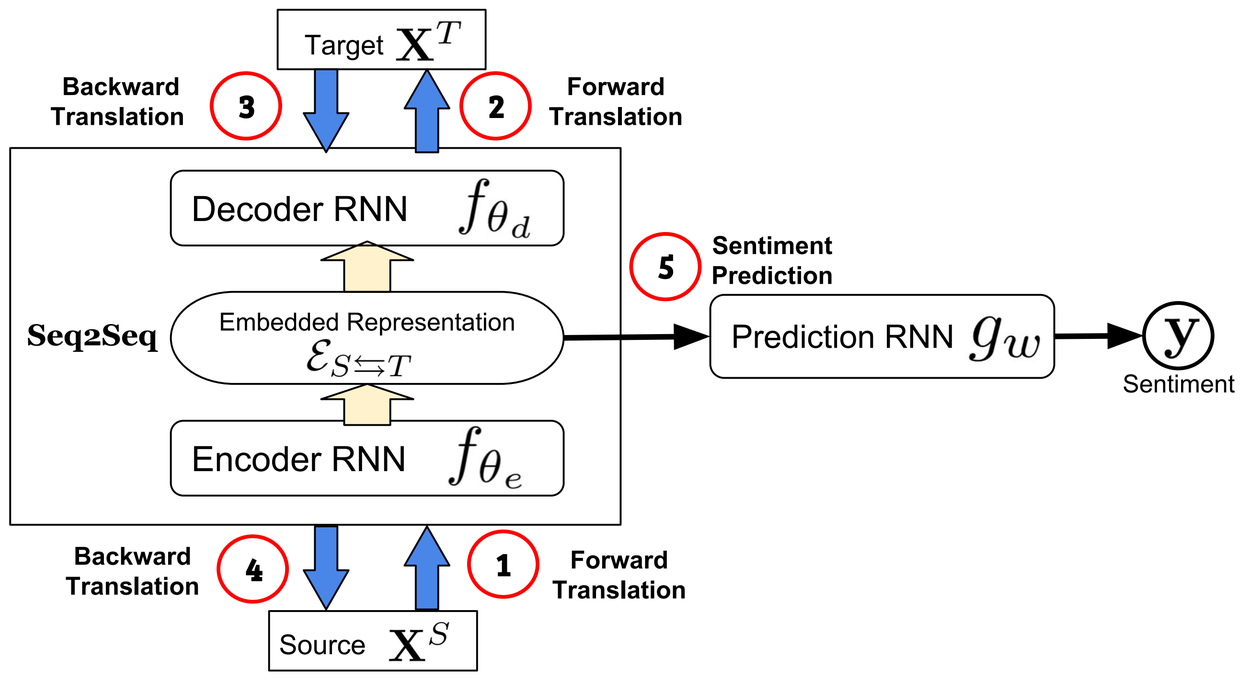
Both modalities required at test time!
Sensitive to missing/noisy visual modality.

- Our approach: Found in Translation



Only language modality required at test time!

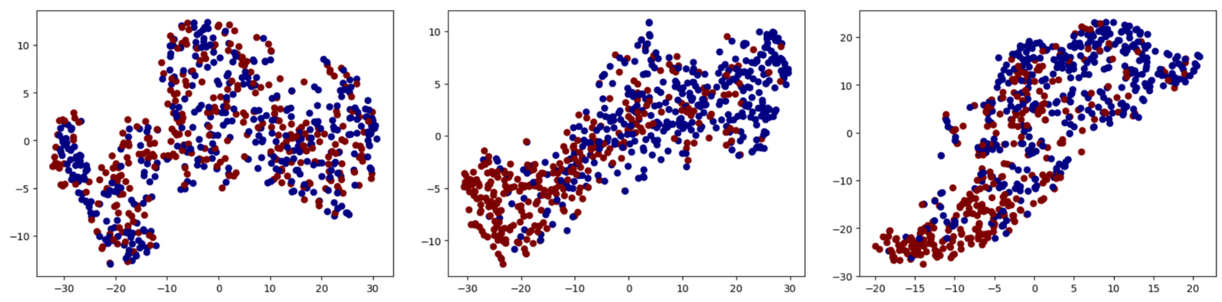
MULTIMODAL CYCLIC TRANSLATION NETWORK (MCTN)



- Forward translation loss $\mathcal{L}_t = \mathbb{E}[\ell_{\mathbf{X}^T}(\hat{\mathbf{X}}^T, \mathbf{X}^T)]$
- Cycle consistent loss $\mathcal{L}_c = \mathbb{E}[\ell_{\mathbf{X}^S}(\hat{\mathbf{X}}^S, \mathbf{X}^S)]$
- Prediction loss $\mathcal{L}_p = \mathbb{E}[\ell_{\mathbf{y}}(\hat{\mathbf{y}}, \mathbf{y})]$

$$\mathcal{L} = \lambda_t \mathcal{L}_t + \lambda_c \mathcal{L}_c + \mathcal{L}_p$$

EMBEDDED REPRESENTATION WITH t-SNE

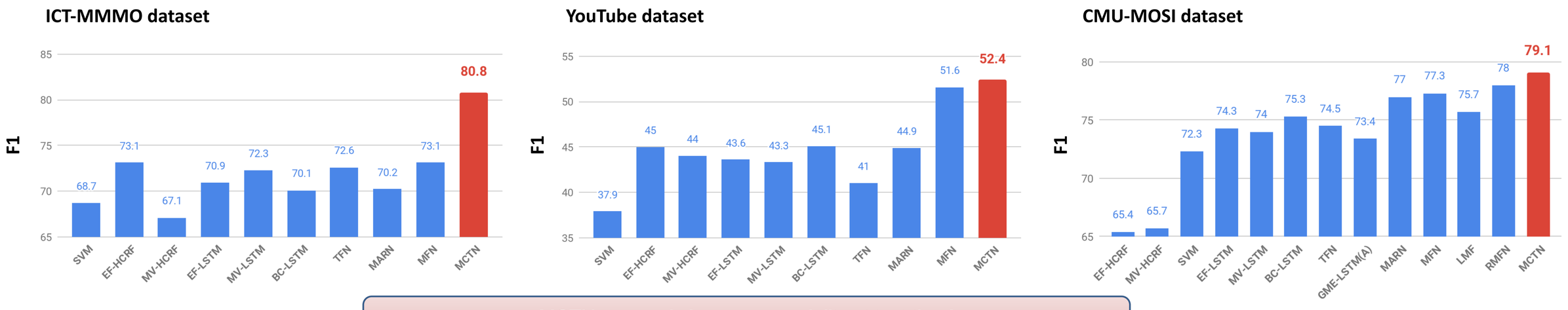


MCTN:
No cycle consistent loss
2 modalities

MCTN:
With cycle consistent loss
2 modalities

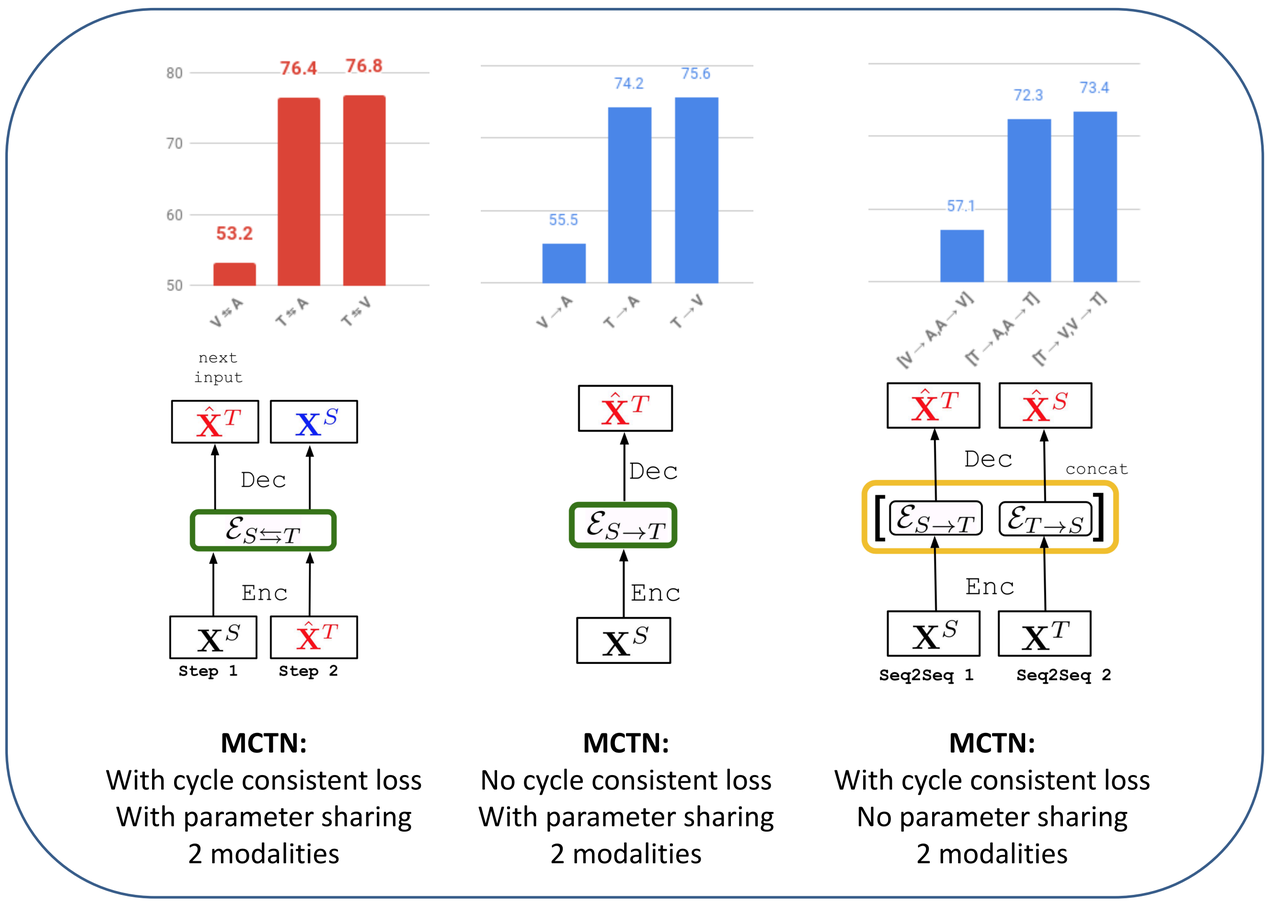
MCTN:
With cycle consistent loss
3 modalities

STATE-OF-THE-ART PREDICTION RESULTS



MCTN uses only language modality at test time!

ABLATION STUDY



MCTN:
With cycle consistent loss
With parameter sharing
2 modalities

MCTN:
No cycle consistent loss
With parameter sharing
2 modalities

MCTN:
With cycle consistent loss
No parameter sharing
2 modalities

1. Use language as source modality
2. Use cyclic translations
3. Share parameters in seq2seq models

Code and Models:
http://github.com/hainow/MCTN