



Text-Visual Prompting for Efficient 2D Temporal Video Grounding

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CVP R

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Introduction

What is temporal video grounding (TVG)?

TVG is to predict the starting/ending time points of moments described by a text sentence within a long untrimmed video.

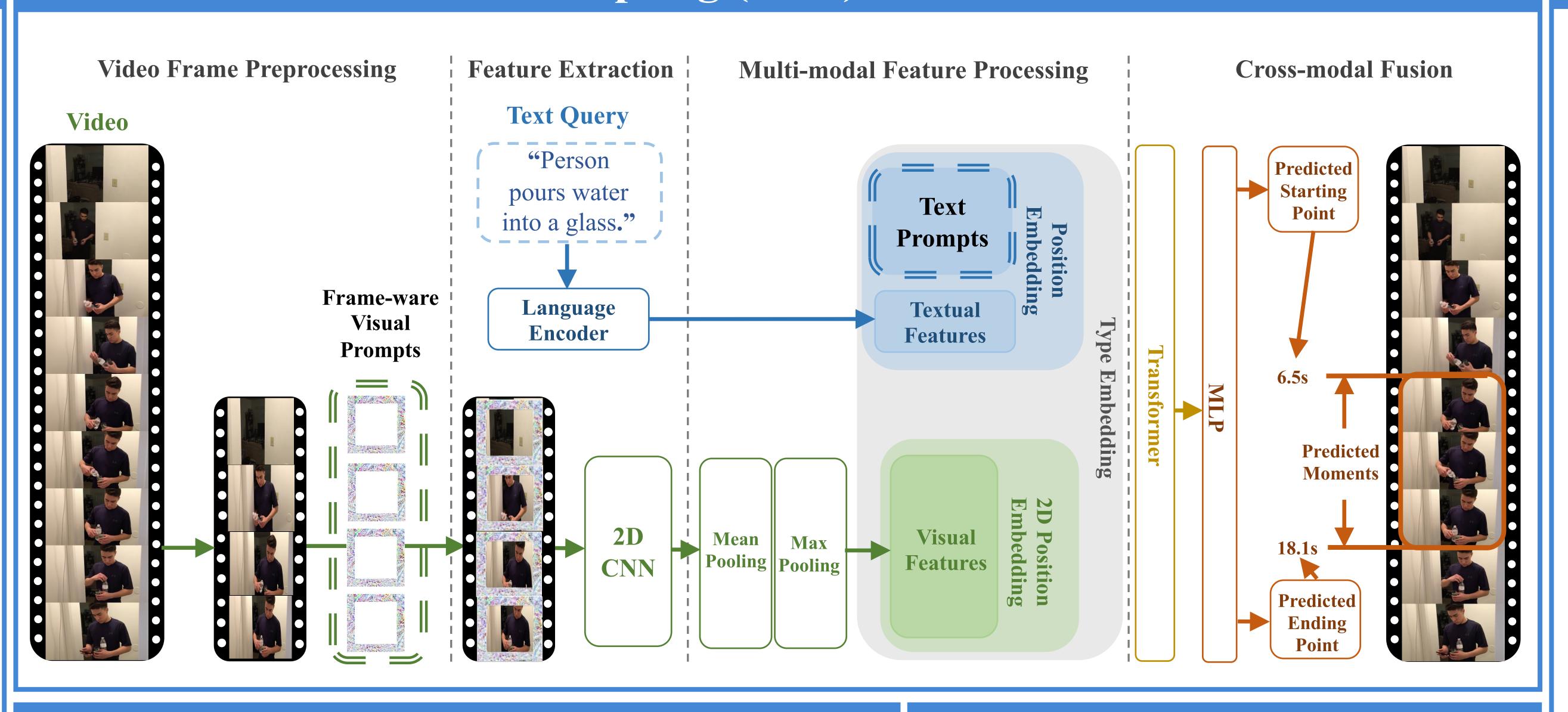
Motivation

High complexity
of 3D CNNs makes extracting
dense 3D visual features timeconsuming, which calls
for intensive memory and
computing resources.

Challenges

How to advance 2D TVG methods so as to achieve comparable results to 3D TVG methods?

Text-Visual Prompting (TVP) Framework for TVG



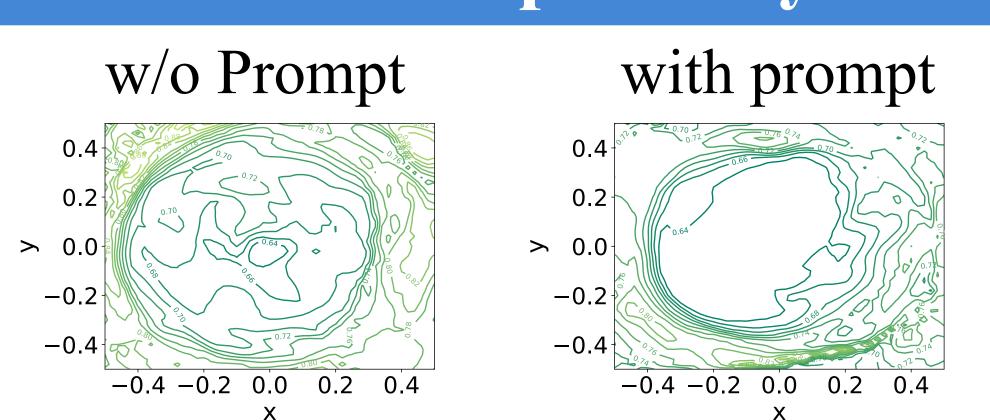
Loss Function: TD-IoU Loss

$$\mathcal{L} = \mathcal{L}_{\text{tIoU}} + \beta_1 \mathcal{L}_{\text{dis}} + \beta_2 \mathcal{L}_{\text{dur}}$$

$$\mathcal{L}_{\text{tIoU}} = \left(1 - \frac{\hat{\mathbf{T}}(\boldsymbol{\theta}) \cap \mathbf{T}}{\hat{\mathbf{T}}(\boldsymbol{\theta}) \cup \mathbf{T}}\right) \qquad \mathcal{L}_{\text{dur}} = \max\left(\frac{|\mathbf{T} - \hat{\mathbf{T}}(\boldsymbol{\theta})|}{|\mathbf{T}|}, \alpha_2\right)$$

$$\mathcal{L}_{\text{dis}} = \max\left(\frac{|(t_{\text{sta}} + t_{\text{end}})/2 - (\hat{t}_{\text{sta}} + \hat{t}_{\text{end}})/2|}{|\hat{\mathbf{T}} \cup \mathbf{T}|}, \alpha_1\right)$$

Loss Landscape Analysis



Overall Results

Charades-STA

Type	Method	Visual	Acc(R@1, IoU=m)						
Туре		Feature	m=0.3	m=0.5	m=0.7				
	CTRL [14]	C3D	_	23.63	8.89				
	ABLR [67]	C3D	_	24.36	9.01				
	BPNet [62]	C3D	55.46	38.25	20.51				
	LPNet [61]	C3D	59.14	40.94	21.13				
	QSPN [64]	C3D	54.70	35.60	15.80				
	TSP-PRL [60]	C3D	_	45.45	24.75				
3D TVG	TripNet [18]	C3D	54.64	38.29	16.07				
	DRN [69]	C3D	_	45.40	26.40				
	CPNet [34]	C3D	_	40.32	22.47				
	DEBUG [43]	C3D	54.95	37.39	17.92				
	ExCL [16]	I3D	61.50	44.1	22.40				
	VSLNet [73]	I3D	64.30	47.31	30.19				
	MAN [71]	I3D	_	46.53	22.72				
	MCN [1]	VGG	_	17.46	8.01				
2D TVG	SAP [7]	VGG	-	27.42	13.36				
Ours									
TVP-Based 2D TVG	Base w/o prompts	ResNet	61.29	40.43	19.89				
	Base + Visual Prompts		65.38	44.31	20.22				
	Base + Text Prompts		65.81	43.44	20.65				
	Base + Both Prompts		65.92	44.39	21.51				

ActivityNet Captions

Туре	Method	Visual		Acc(R@1, IoU=m)				
		Feature	m=0.3	m=0.5	m = 0.7			
3D TVG	CTRL [14]	C3D	28.70	14.00	_			
	BPNet [62]	C3D	59.98	42.07	24.69			
	LPNet [61]	C3D	64.29	45.92	25.39			
	QSPN [64]	C3D	45.30	27.70	13.60			
	TSP-PRL [60]	C3D	56.02	38.83	-			
	TripNet [18]	C3D	48.42	32.19	13.93			
	DRN [69]	C3D	-	45.45	24.36			
	CPNet [34]	C3D	-	40.56	21.63			
	ABLR [67]	C3D	55.67	36.79	-			
	DEBUG [43]	C3D	55.91	39.72	-			
	ExCL [16]	C3D	63.00	43.60	24.10			
	VSLNet [73]	C3D	63.16	43.22	26.16			
Ours								
TVP-Based 2D TVG	Base w/o prompts	ResNet	57.20	40.16	19.14			
	Base + Visual Prompts		60.12	43.39	23.71			
	Base + Text Prompts		60.48	42.58	24.39			
	Base + Both Prompts		60.71	43.44	25.03			