Paper Presentation

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Less is More: CLIPBERT for Video-and-Language Learning via Sparse Sampling

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How do intelligent agents understand visual and textual clues in real world videos?

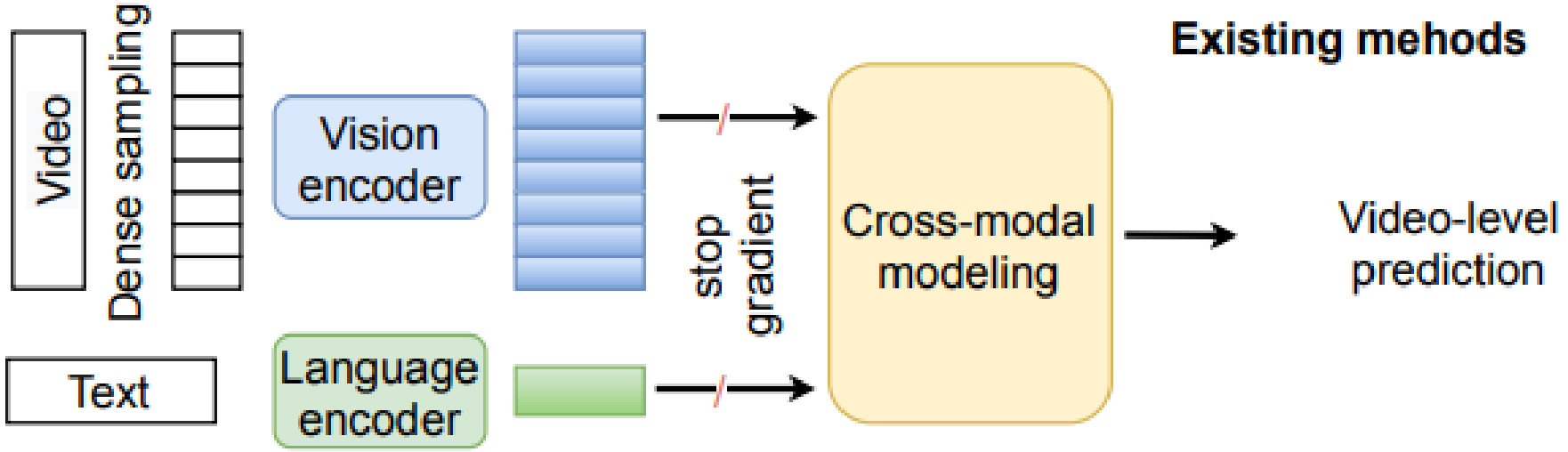
Video and Language Models

- Traditional Cross-modal approaches
  - Text-to-video retrival
  - Video captioning
  - Video question answering
  - Video moment retrival

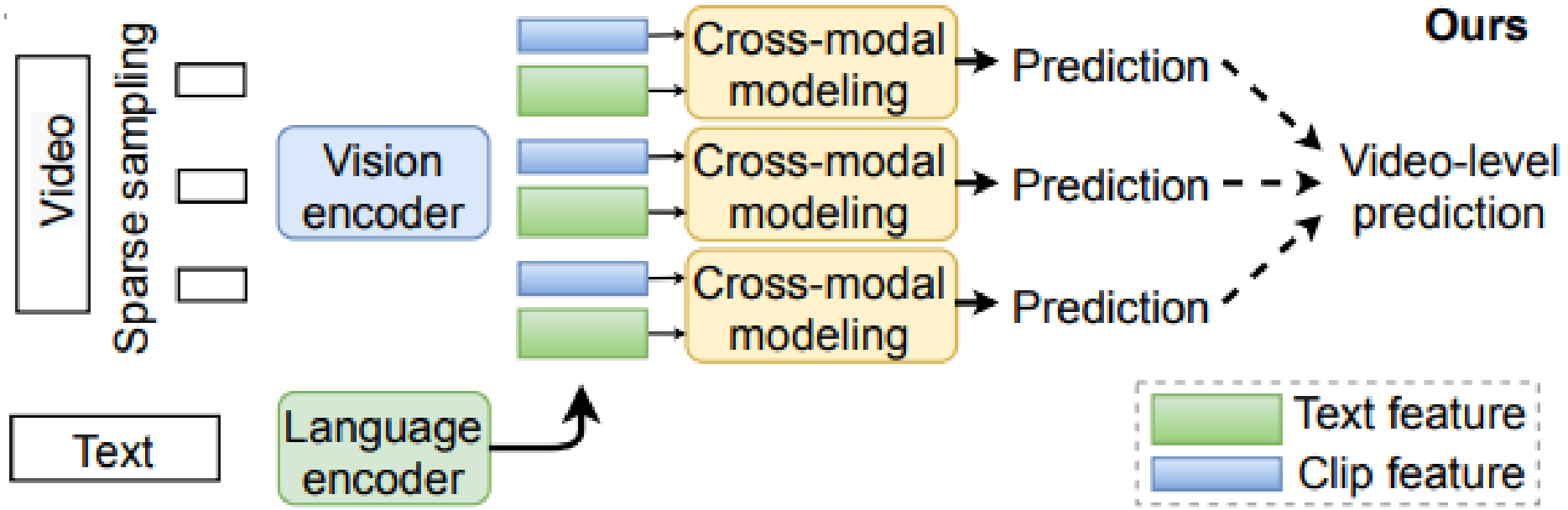
- General Mechanism
  - Step 1: extractdense video features using pre-trained vision models
  - Step 2: extract text features form pre-trained
  - Step 3: complex fusion mechanism for wrangling these static features

How do intelligent agents understand visual and textual clues in real world videos?

Drawbacks of Traditional Cross-modal approaches



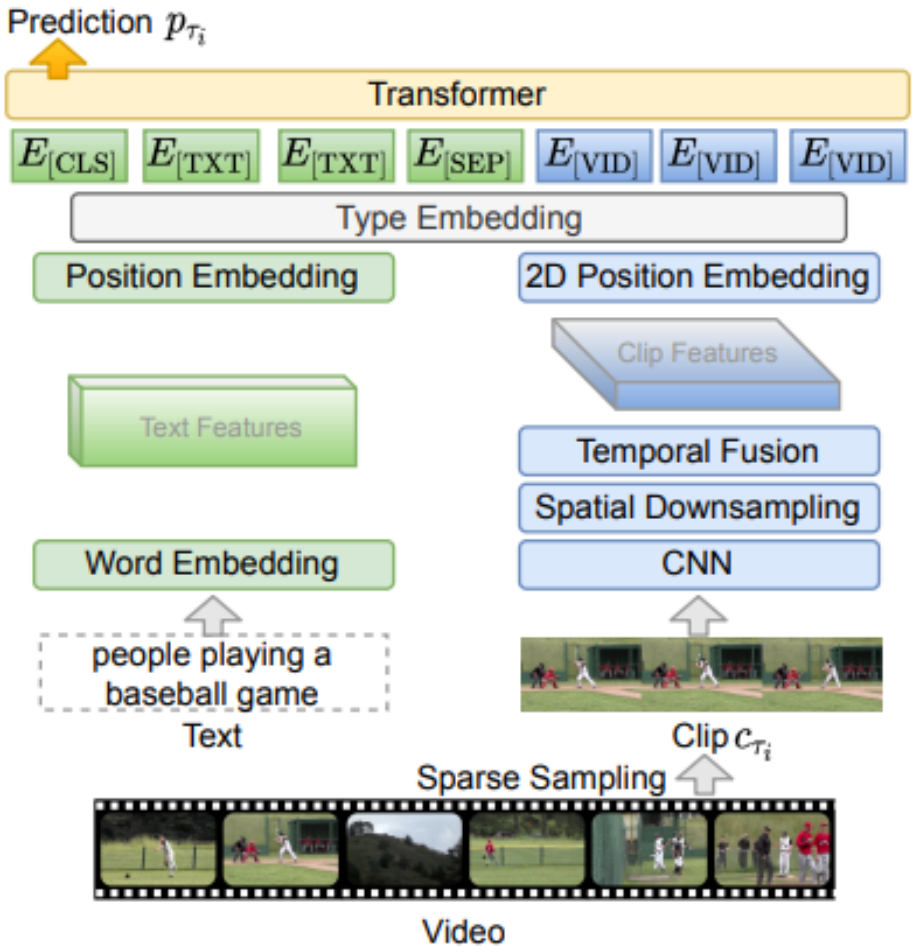
CLIPBERT for Video-and-Language Learning via Sparse Sampling - *Abstract*



CLIPBERT for Video-and-Language Learning via Sparse Sampling - *Architecture*

- **Vision Encoder**
  - 2D ResNet-50
- **Language Encoder, Cross-modal Modeling**
  - BERT based
- **Image-Text Pre-training**
  - COCO and Visual Genome captions

- Benifitted against high cost of video-text pre-training
- Cross-modal feature learning, enabling mitual co-relation between the video and text encoders



CLIPBERT for Video-and-Language Learning via Sparse Sampling - *Experimental Settings*

- Downstream Tasks
  - Text-to-video Retrival
    - Datasets - MSRVTT , DiDeMo, ActivityNet Captions
  - Video Question Answering
    - Datasets - TGIF-QA, MSRVTT-QA, MSRVTT multiple-choice test

Average length of videos in the datasets (in Seconds)

CLIPBERT for Video-and-Language Learning via Sparse Sampling - *Experimental Results*

- Text-to-video retrieval

Method	R1	R5	R10	MdR
HERO [37] ASR, PT	20.5	47.6	60.9	-
JSFusion [77]	10.2	31.2	43.2	13.0
HT [46] PT	14.9	40.2	52.8	9.0
ActBERT [83] PT	16.3	42.8	56.9	10.0
HERO [37] PT	16.8	43.4	**57.7**	-
CLIPBERT 4×1	**19.8**	**45.1**	57.5	**7.0**
CLIPBERT 8×2	**22.0**	**46.8**	**59.9**	**6.0**

(a) MSRVTT 1K test set.

Method	R1	R5	R10	MdR
CE [41]	16.1	41.1	-	8.3
S2VT [65]	11.9	33.6	-	13.0
FSE [80]	13.9	36.0	-	11.0
CLIPBERT 4×1	**19.9**	**44.5**	**56.7**	**7.0**
CLIPBERT 8×2	**20.4**	**48.0**	**60.8**	**6.0**

(b) DiDeMo test set.

Method	R1	R5	R10	MdR
CE [41]	18.2	47.7	-	6.0
MMT [15]	22.7	54.2	93.2	5.0
MMT [15] PT	28.7	61.4	94.5	3.3
Dense [28]	14.0	32.0	-	34.0
FSE [80]	18.2	44.8	-	7.0
HSE [80]	20.5	**49.3**	-	-
CLIPBERT 4×2*	**20.9**	48.6	**62.8**	**6.0**
CLIPBERT 4×2* (N_{test}=20)	**21.3**	**49.0**	**63.5**	**6.0**

(c) ActivityNet Captions val1 set.

CLIPBERT for Video-and-Language Learning via Sparse Sampling - *Experimental Results*

- Video Question Answering

Method	Action	Transition	FrameQA
ST-VQA [23]	60.8	67.1	49.3
Co-Memory [17]	68.2	74.3	51.5
PSAC [38]	70.4	76.9	55.7
Heterogeneous Memory [12]	73.9	77.8	53.8
HCRN [31]	75.0	81.4	55.9
QueST [25]	75.9	81.0	**59.7**
CLIPBERT 1×1 (N_{test}=1)	**82.9**	**87.5**	59.4
CLIPBERT 1×1	**82.8**	**87.8**	**60.3**

(a) TGIF-QA test set.

Method	Accuracy
ST-VQA [23] (by [12])	30.9
Co-Memory [17] (by [12])	32.0
AMU [74]	32.5
Heterogeneous Memory [12]	33.0
HCRN [31]	35.6
CLIPBERT 4×1	**37.0**
CLIPBERT 8×2	**37.4**

(b) MRSVTT-QA test set.

Method	Accuracy
SNUVL [78] (by [77])	65.4
ST-VQA [23] (by [77])	66.1
CT-SAN [79] (by [77])	66.4
MLB [27] (by [77])	76.1
JSFusion [77]	83.4
ActBERT [83] PT	85.7
CLIPBERT 4×1	**87.9**
CLIPBERT 8×2	**88.2**

(c) MRSVTT multiple-choice test.

Application to Veriff’s identity verification

- **ID Verification Software**
  - Real-time feedback with Assisted Image Capture

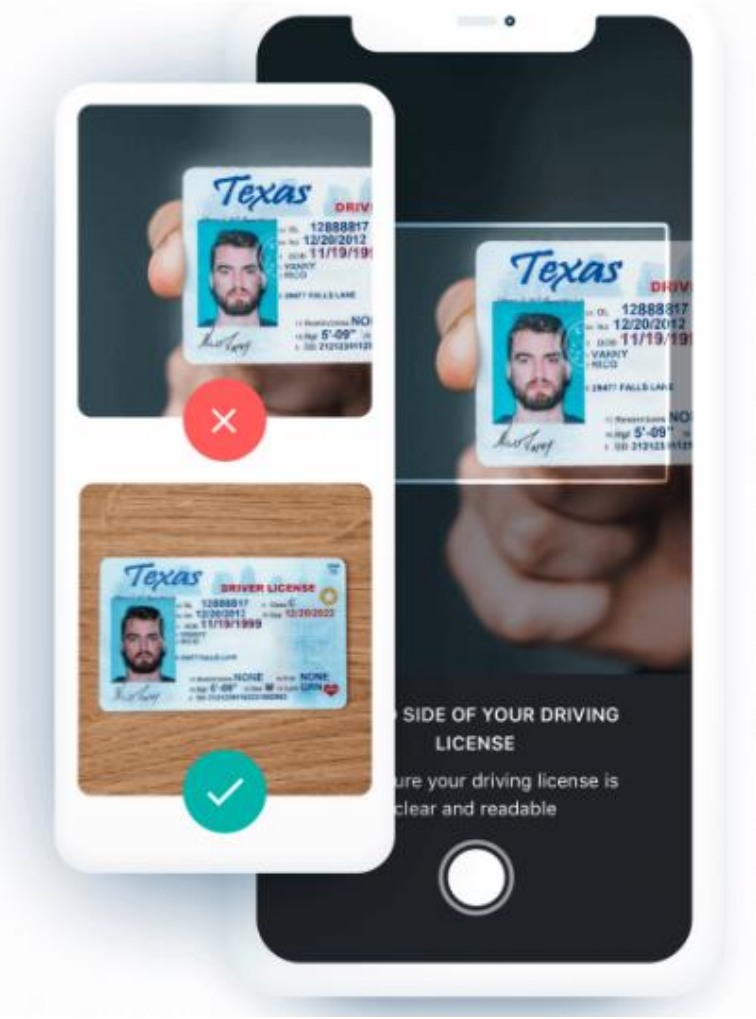


Photo taken from https://www.veriff.com/product/id-verification
Last accessed 19.10.2021

Questions

and

Thank You!