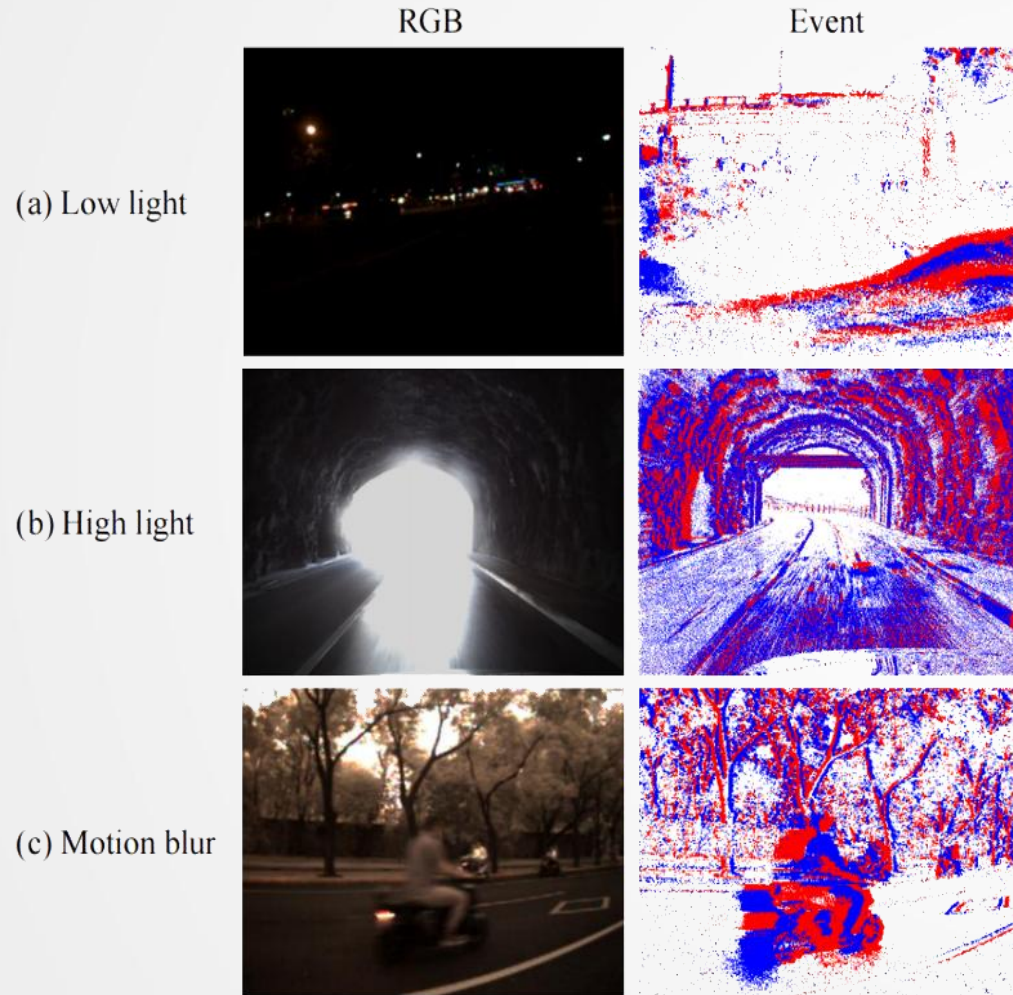


A Chaotic Dynamics Framework Inspired by Dorsal Stream for Event Signal Processing

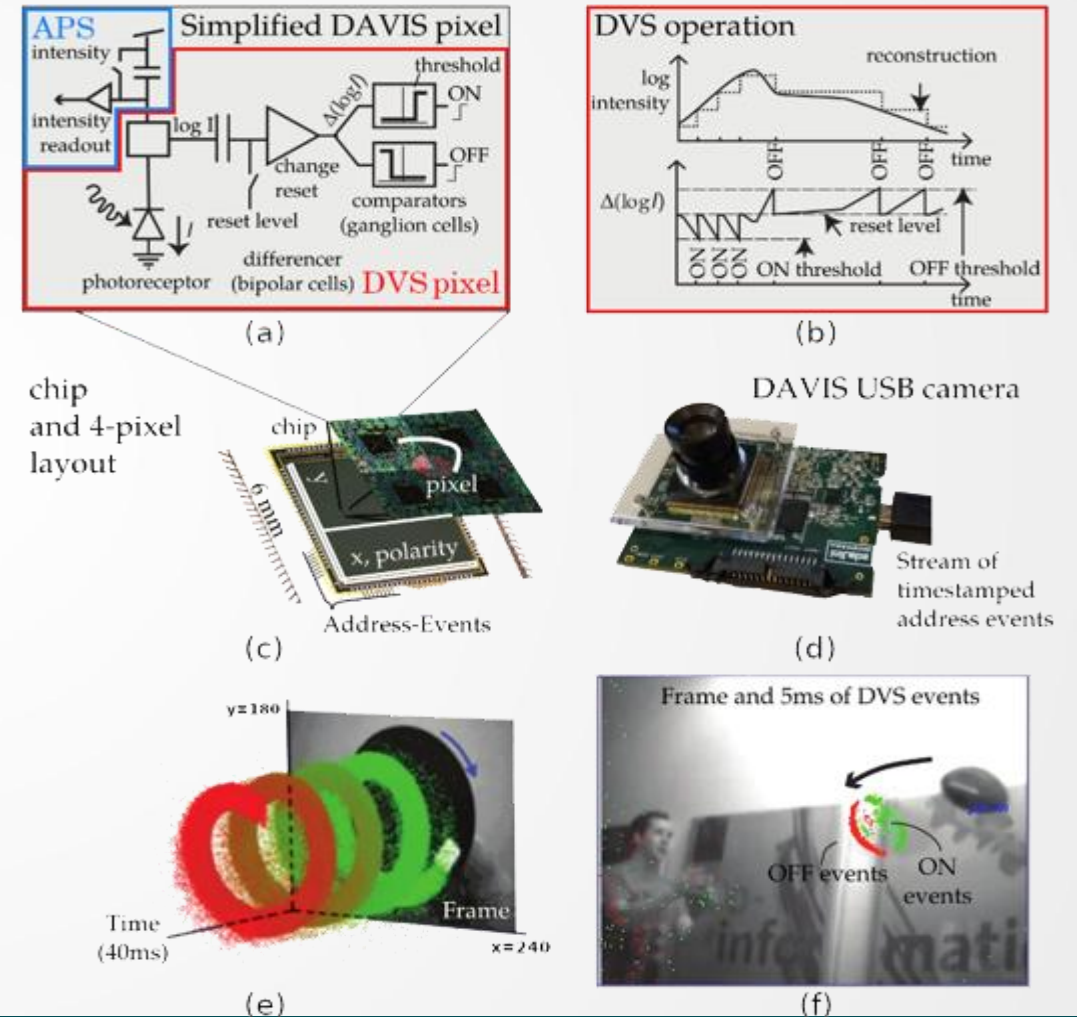
Yu Chen Jing Lian Zhaofei Yu Jizhao Liu Jisheng Dang Gang Wang

Research Background

Problems of Neuromorphic Vision Sensors

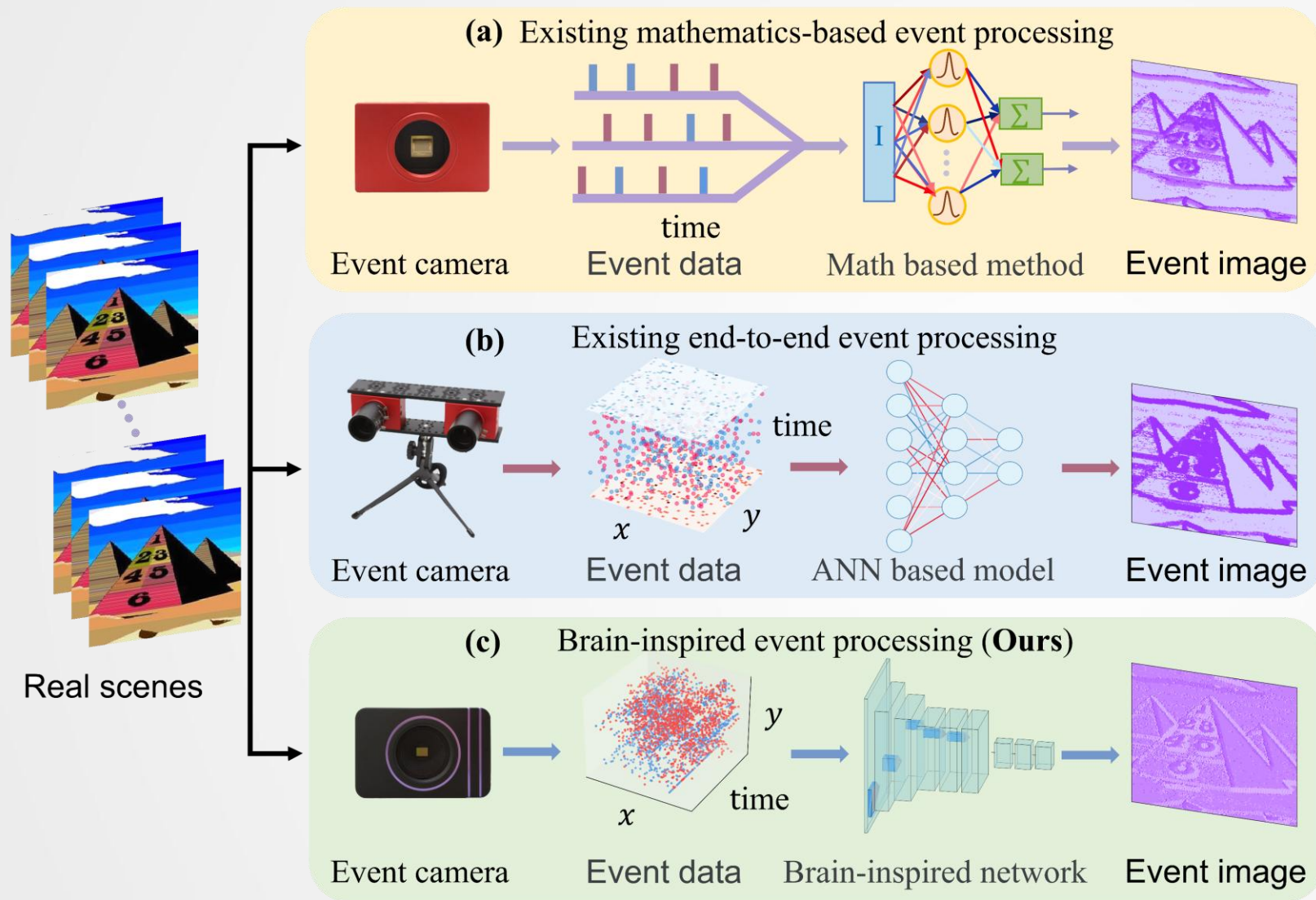


Neuromorphic Vision Sensor



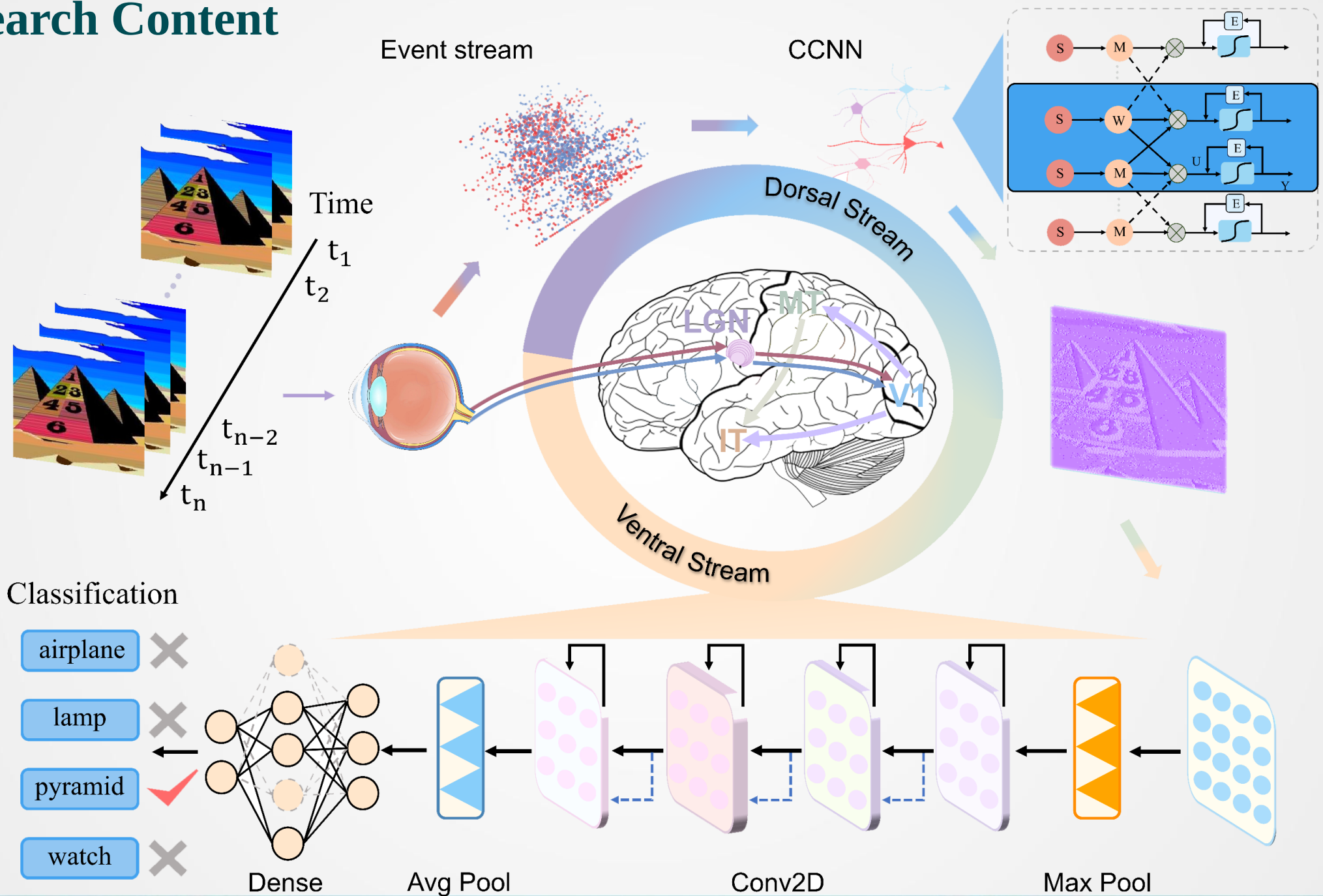
Gallego G, Delbrück T, Orchard G, et al. Event-based vision: A survey[J]. IEEE transactions on pattern analysis and machine intelligence, 2020, 44(1): 154-180.

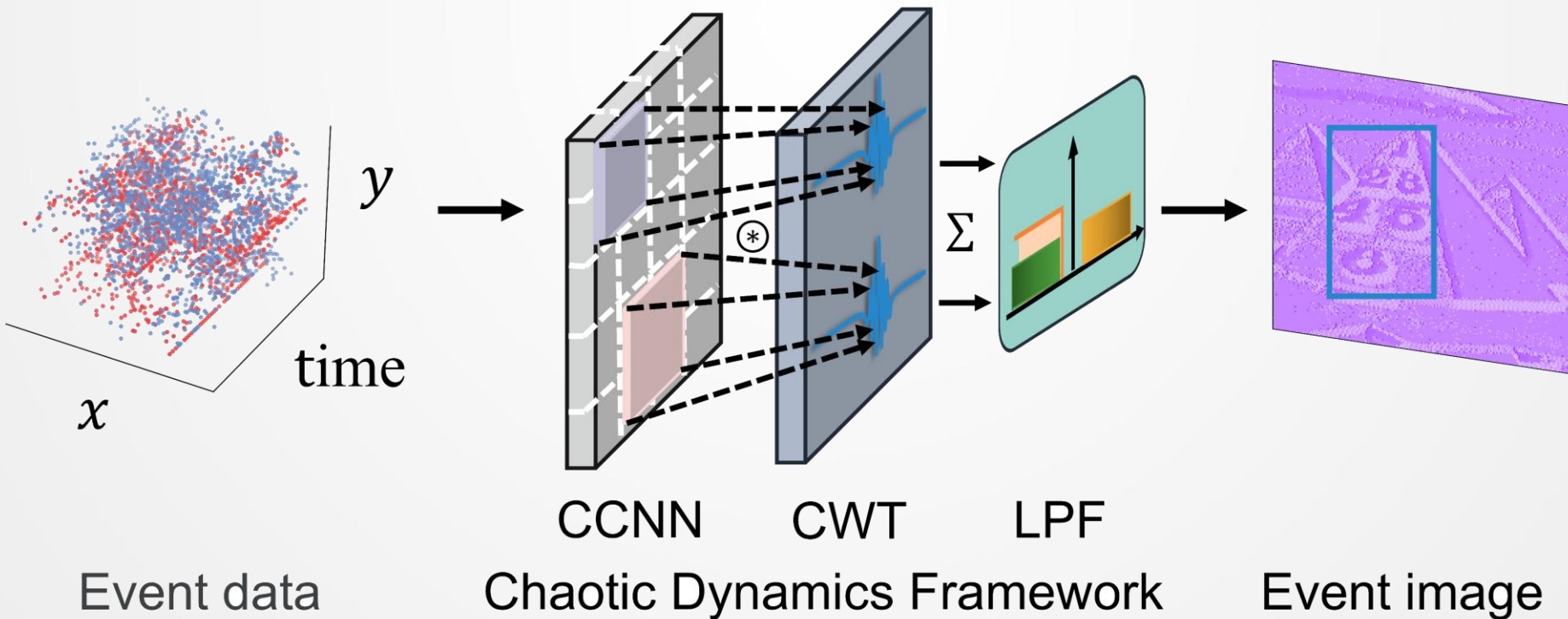
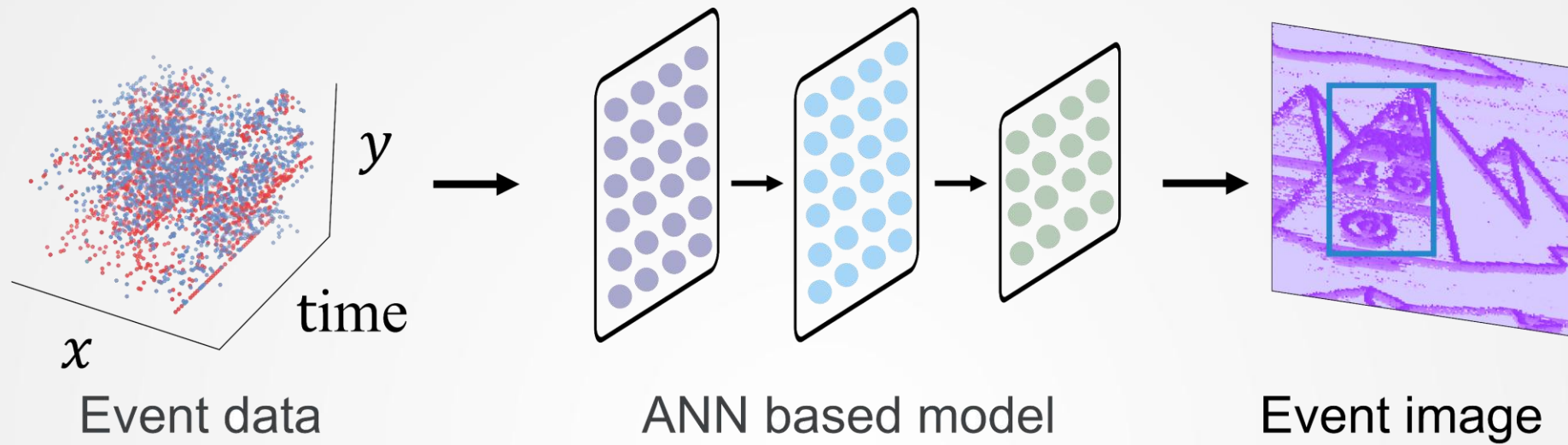
Related Work



Categories	Event	
	Representation	Dimensions
Image	EV-FlowNet	(4,H,W)
	AMAE	(2,H,W)
	SAE	(2,H,W)
	HATS	(2,H,W)
	SITS	(2,H,W)
Learning	EST	(2,B,H,W)
	Matrix-LSTM	(B,H,W)
	EV-VGCNN	(2,B,H,W)
	RG-CNN	N/A
Spike	VMV-GCN	(H,W,A)
	PLIF	N/A
	NDA	N/A
	VPT-STs	N/A

Gehrig D, Loquercio A, Derpanis K G, et al. End-to-end learning of representations for asynchronous event-based data[C]. IEEE International Conference on Computer Vision. 2019: 5633-5643.



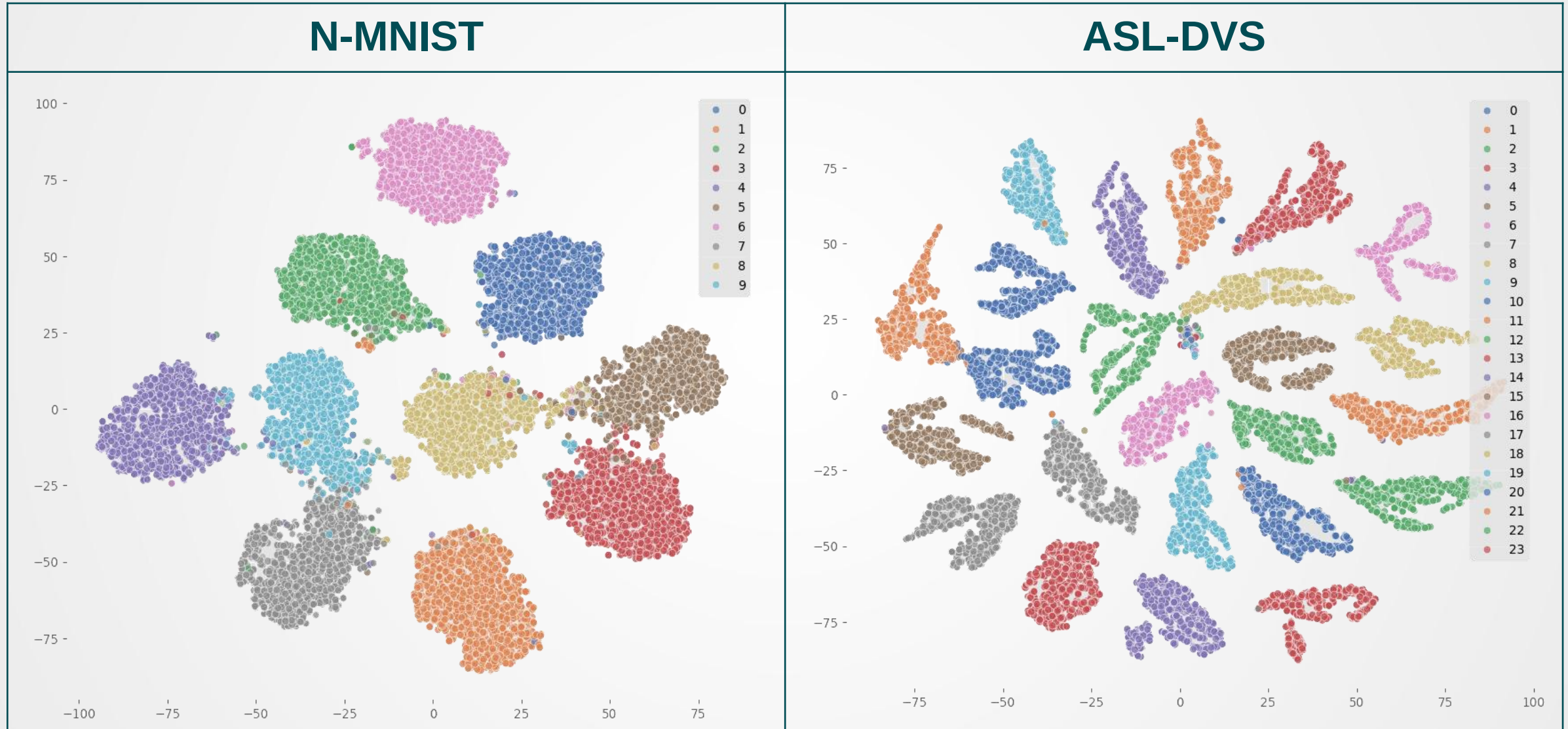




Object Classification

Method	Publication	N-MNIST	N-Caltech101	N-CARS	ASL-DVS
HATS	CVPR	99.1	64.2	90.2	-
EST	ICCV	99.0	75.3	91.9	97.9
AMAE	RAL	98.3	69.4	93.6	98.4
M-LSTM	ECCV	98.6	73.8	92.7	98.0
MVF-Net	CSVT	98.1	68.7	92.7	97.1
EvT	CVPR	98.3	61.3	89.6	99.9
DVS-ViT	ICIP	98.1	63.3	90.7	96.9
GIN	ICLR	75.4	47.6	84.6	51.4
EventNet	CVPR	75.2	42.5	75.9	83.3
RG-CNNs	TIP	99.0	65.7	91.4	90.1
EV-VGCNN	CVPR	99.4	74.8	95.3	98.3
VMV-GCN	RAL	99.5	77.8	93.2	98.9
TORÉ	TPAMI	99.4	79.8	94.5	99.9
RILF	ICCV	99.6	-	-	-
NDA	ECCV	-	78.2	90.1	-
VPT-STs	ICASSP	-	79.2	95.8	-
TOKEN	ICASSP	99.9	81.6	95.4	99.9
Ours		97.37	84.35	99.9	99.2

Visualization of Semantic Distance



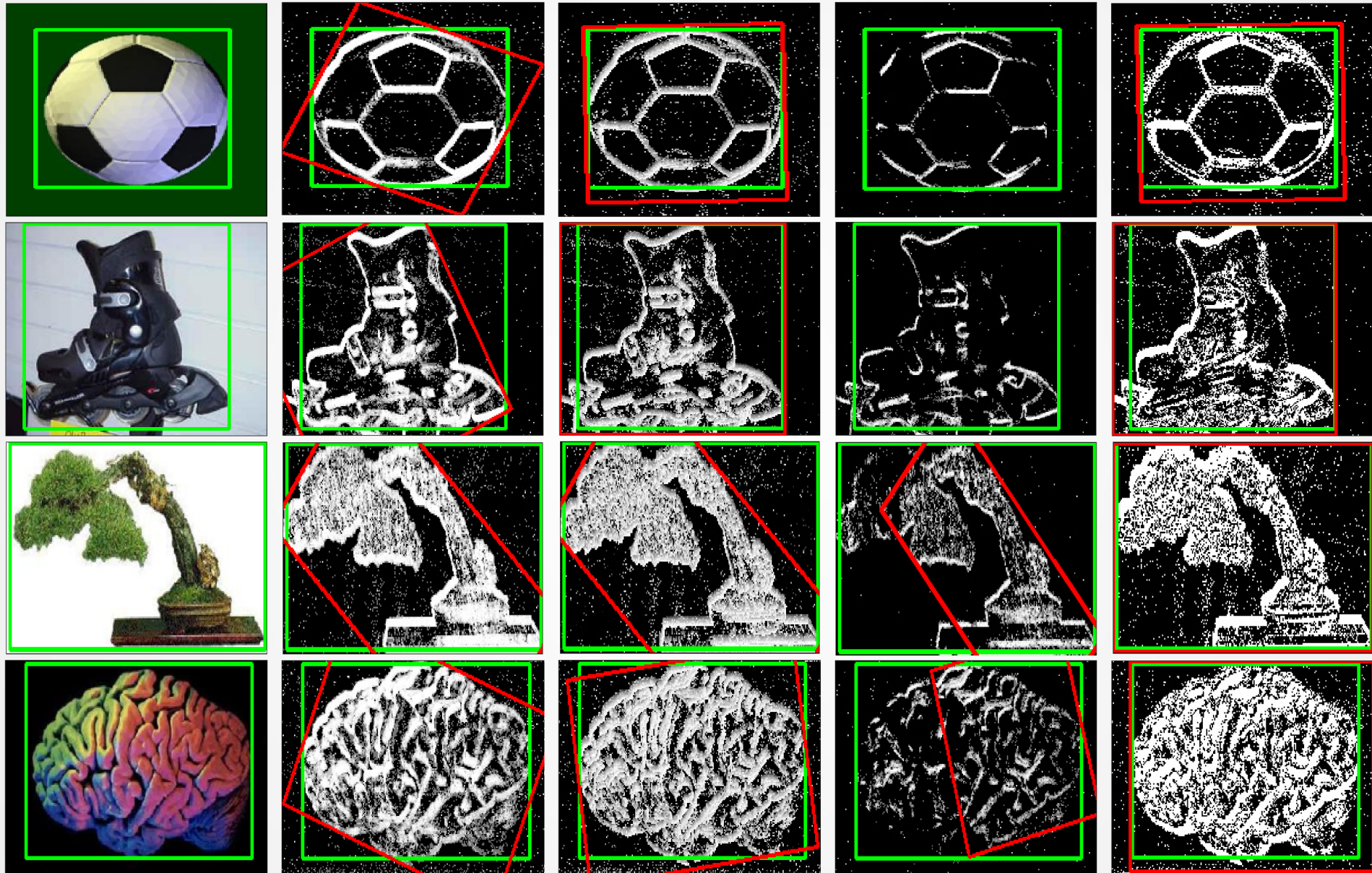


Model Complexity

Method	Params(M)	MACs(G)	Time(ms)
PointNet++	1.8	4.0	103.9
RG-CNNs	19.5	0.8	-
EV-VGCNN	0.8	0.7	7.1
VMV-GCN	0.8	1.3	6.3
EST	21.4	4.3	6.4
M-LSTM	21.4	4.3	6.4
MVF-Net	33.6	5.6	10.1
Ours	21.9	3.7	2.1

Representati on	N-Caltech101 IOU(30000)	N-Caltech101 IOU(50000)	N-Caltech101 IOU(70000)	N-Caltech101 IOU(100000)
Frequency	0.4276	0.5640	0.5896	0.5937
SAE	0.4845	0.5976	0.6089	0.6198
LIF	0.2056	0.2162	0.3722	0.4022
Ours	0.4879	0.6087	0.6357	0.6450

Visualization of Event Representation Methods



RGB Frame

Event Count

Time Surface

LIF

Ours