

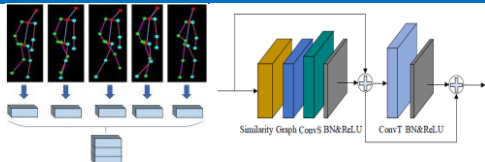
RFC-HyGCN: A Runtime Feature Compress Accelerator for Skeleton-Based Action Recognition Model with Hybrid Pruning

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Background



2s-AGCN: A skeleton-based graph convolutional neural network for action recognition. A human skeleton is modeled as a graph with 25 points, **skeleton graph** and **global relationship graph** are introduced. Graph computation, **spatial and temporal convolution**, BN and shortcut path are embed in a block. Ten blocks and a FC layer consists the whole network.

Motivation



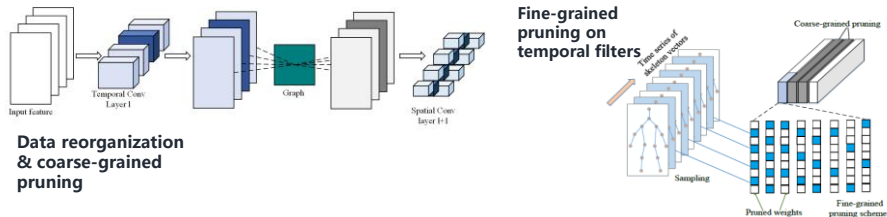
Pose estimation extracting human skeleton features from **video stream** and actual circumstances. GCN action recognition model depends on such algorithm to provides network input.

Challenge:

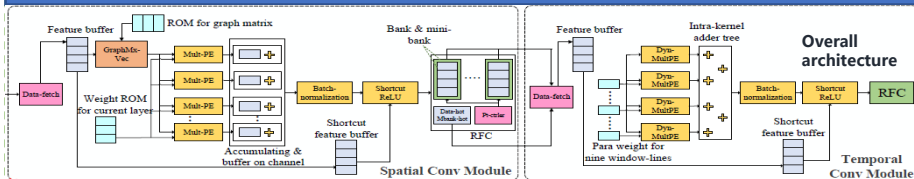
- **Gap of computing performance** between fronted-end algorithm and GCN action recognition models.
- **GCN action recognition models** need high-end GPU to deploy, its complexity puts challenge on embedded device.

Model	Platform	Throughput	Power-efficiency
Mobile-pose	Snapdragon 845	60fps	44.4fps/W
2s-AGCN	Nvidia 2080Ti	28fps	0.11fps/W

Method



Architecture & result



Compared with former GCN action recognition accelerator

	dsp	bram blocks	LUT	dsp efficiency	peak perf	frequency	fps
ours	3544	1806	176776	0.322GOPS/DSP	1142GOPS	172Mhz	271.25
[10]	228	151	44457	0.202GOPS/DSP	46GOPS	188Mhz	11.99

Compared with high-end GPU

	ours	2080Ti-original	V100-original	2080Ti(w/o C)	V100(w/o C)	2080Ti-skip	V100-skip
throughput	271.25	29.53	69.38	45.42	98.87	104	199.09
speed-up		9.19	3.91	5.97	2.74	2.61	1.36

Runtime feature compress module

