Context-Aware Residual Module for Image Classification

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Presenter

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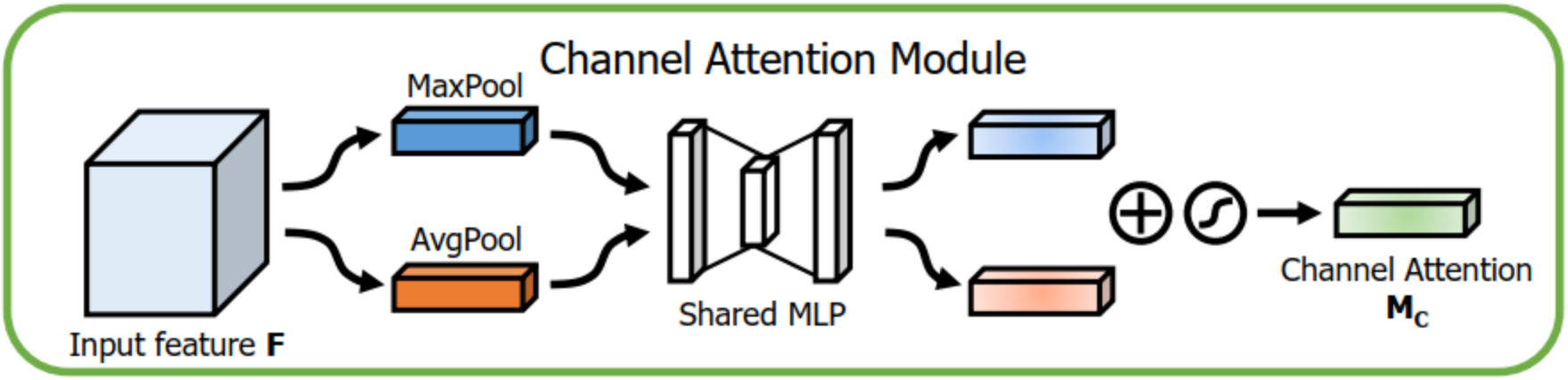
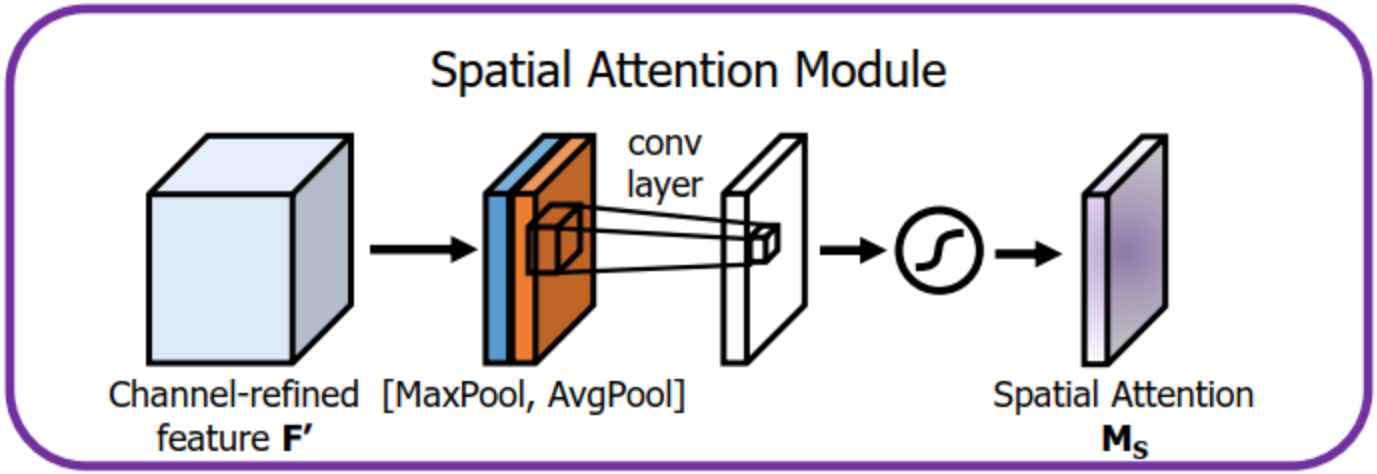
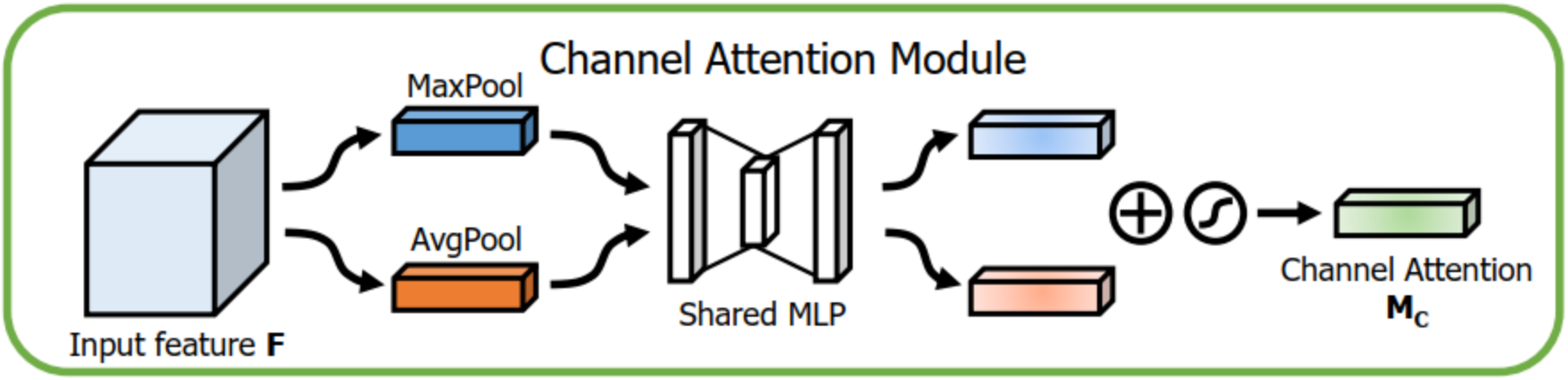
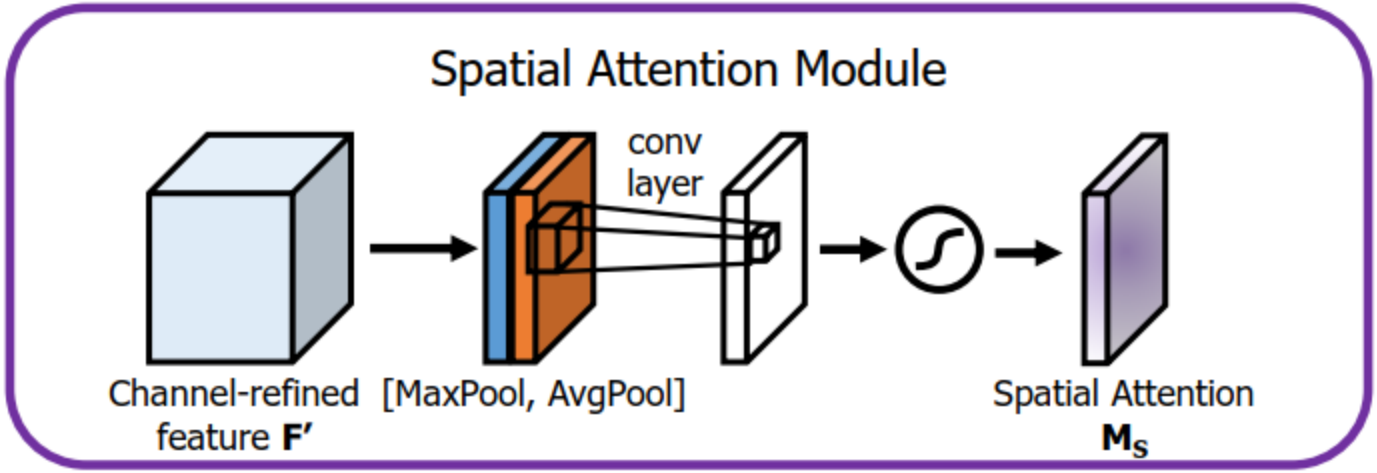
Challenge


Channel Attention Module
MaxPool
AvgPool
Shared MLP
Input feature F
Channel Attention
M_C


Spatial Attention Module
conv
layer
Channel-refined
feature F′
[MaxPool, AvgPool]
Spatial Attention
M_S

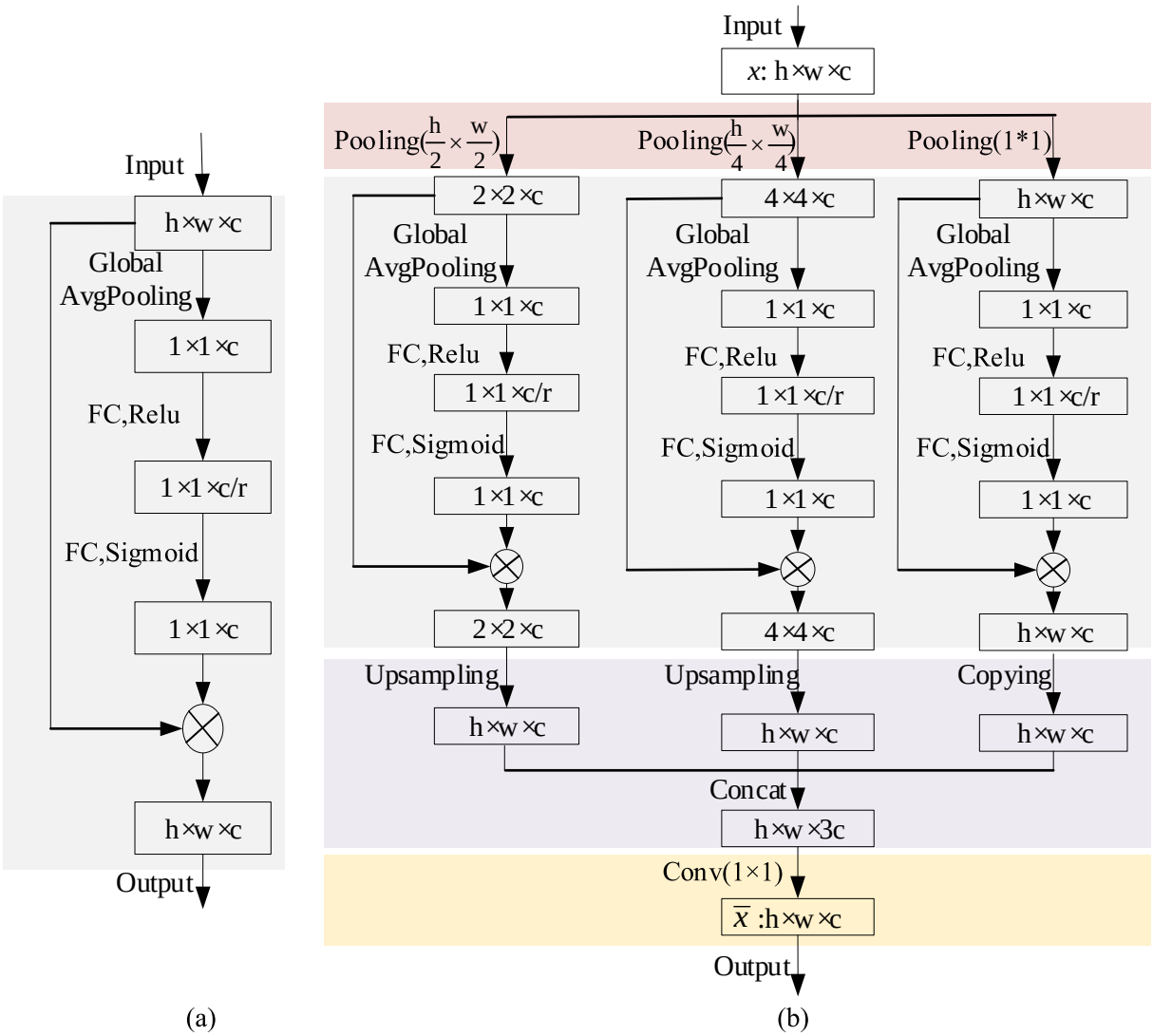
Challenge





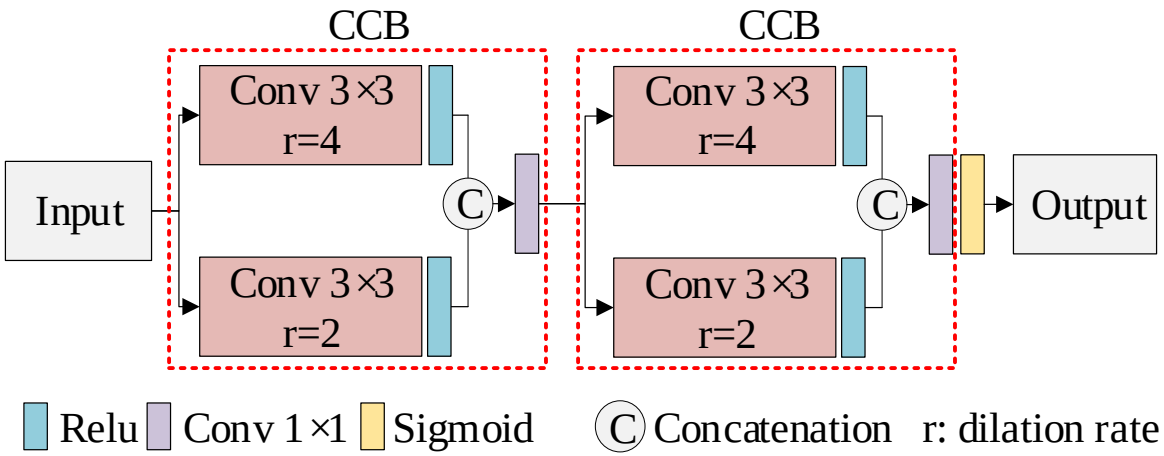
attention mechanisms only on **single-scale** visual perception fields

Our Methods



multi-scale channel attention module(**MSCAM**)

Our Methods



multi-scale spatial aware module(**MSSAM**)

Instantiations

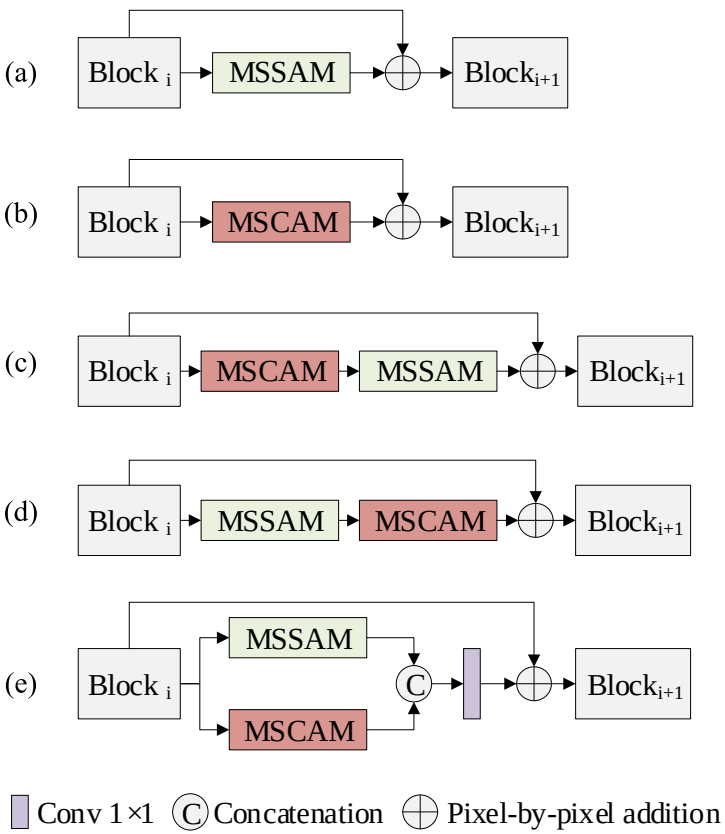


TABLE IV. COMPARISONS OF DIFFERENT ABLATION STRATEGIES ON CIFAR100

Network	Param. (M)	Top-1 err. (%)
ResNet18	11.18	24.99
ResNet18+MSCAM	**12.35**	23.55
ResNet18+MSSAM	25.10	24.64
ResNet18+MSSAM+MSCAM	26.29	24.88
ResNet18+MSCAM+MSSAM	26.29	24.62
ResNet18+MSSAM&MSCAM	26.63	**23.45**
ResNet50	**23.52**	23.13
ResNet50+MSCAM	42.34	21.46
ResNet50+MSSAM	246.36	22.13
ResNet50+MSSAM+MSCAM	265.18	22.59
ResNet50+MSCAM+MSSAM	265.18	23.18
ResNet50+MSSAM&MSCAM	270.75	**21.19**

Results

TABLE V. ACCURACY RATES (%) AND PARAMTER QUANTITY (M) COMPARISONS OF STATE-OF-THE-ART NETWORKS ON VARIOUS DATASETS

Network	CIFAR10	CIFAR100	Tiny-ImageNet
	Top-1 err. (%)| params. (M)	*Top-1 err. (%) | params. (M)*	*Top-1 err. (%) | Top-5 err. (%) | params. (M)*
ResNet18	7.36|**11.17**	25.07|**11.22**	44.87|21.10|**11.28**
ResNet18+CAM[10]	7.32|11.22	24.42|11.26	44.41|20.45|11.32
ResNet18+CBAM[11]	7.32|11.22	24.84|11.27	44.10|20.50|11.32
ResNet18+MSCAM	7.07|12.35	23.55|12.40	43.72|20.61|12.45
ResNet18+MSC&SAM	**7.02**|26.63	**23.41**|26.68	**43.62**|**20.29**|26.73
ResNet34	7.36|**21.28**	23.90|**21.33**	44.13|20.40|**21.39**
ResNet34+CAM[10]	7.09|21.33	23.08|21.37	44.41|21.12|21.42
ResNet34+CBAM[11]	**6.60**|21.33	23.20|21.37	44.14|20.95|21.42
ResNet34+MSCAM	6.77|22.46	22.62|22.51	43.86|20.33|22.56
ResNet34+MSC&SAM	6.92|36.74	**22.59**|36.79	**43.53**|**20.33**|36.84
ResNet50	6.86|**23.52**	23.13|**23.71**	46.17|22.95|**23.92**
ResNet50+CAM[10]	6.61|24.22	22.23|24.41	47.83|23.65|24.61
ResNet50+CBAM[11]	7.35|24.22	21.88|24.41	46.45|22.92|24.61
ResNet50+MSCAM	**6.44**|42.34	21.46|42.52	43.68|20.60|42.73
ResNet50+MSC&SAM	6.57|270.75	**21.33**|270.9	**42.58**|**19.33**|271.1
ResNet101	7.78|**42.51**	21.90|**42.70**	43.41|20.40|**42.91**
ResNet101+CAM[10]	6.97|43.21	22.44|43.40	43.83|20.28|43.60
ResNet101+CBAM[11]	7.41|43.21	21.67|43.40	44.29|21.17|43.60
ResNet101+MSCAM	**6.95**|61.33	**21.33**|61.51	43.81|20.28|61.72
ResNet101+MSC&SAM	6.99|289.75	21.83|290.0	**42.36**|**19.41**|290.1
Xception	8.47|**20.83**	23.82|**21.01**	46.86|21.27|**21.22**
Xception+CAM[10]	**7.78**|21.49	23.64|21.67	40.28|18.45|21.88
Xception+CBAM[11]	7.94|21.49	23.64|21.67	40.72|18.65|21.88
Xception+MSCAM	8.14|38.57	**23.49**|38.75	39.96|18.06|38.96
Xception+MSC&SAM	8.15|254.02	23.64|254.2	**39.74**|**17.59**|254.4

Results

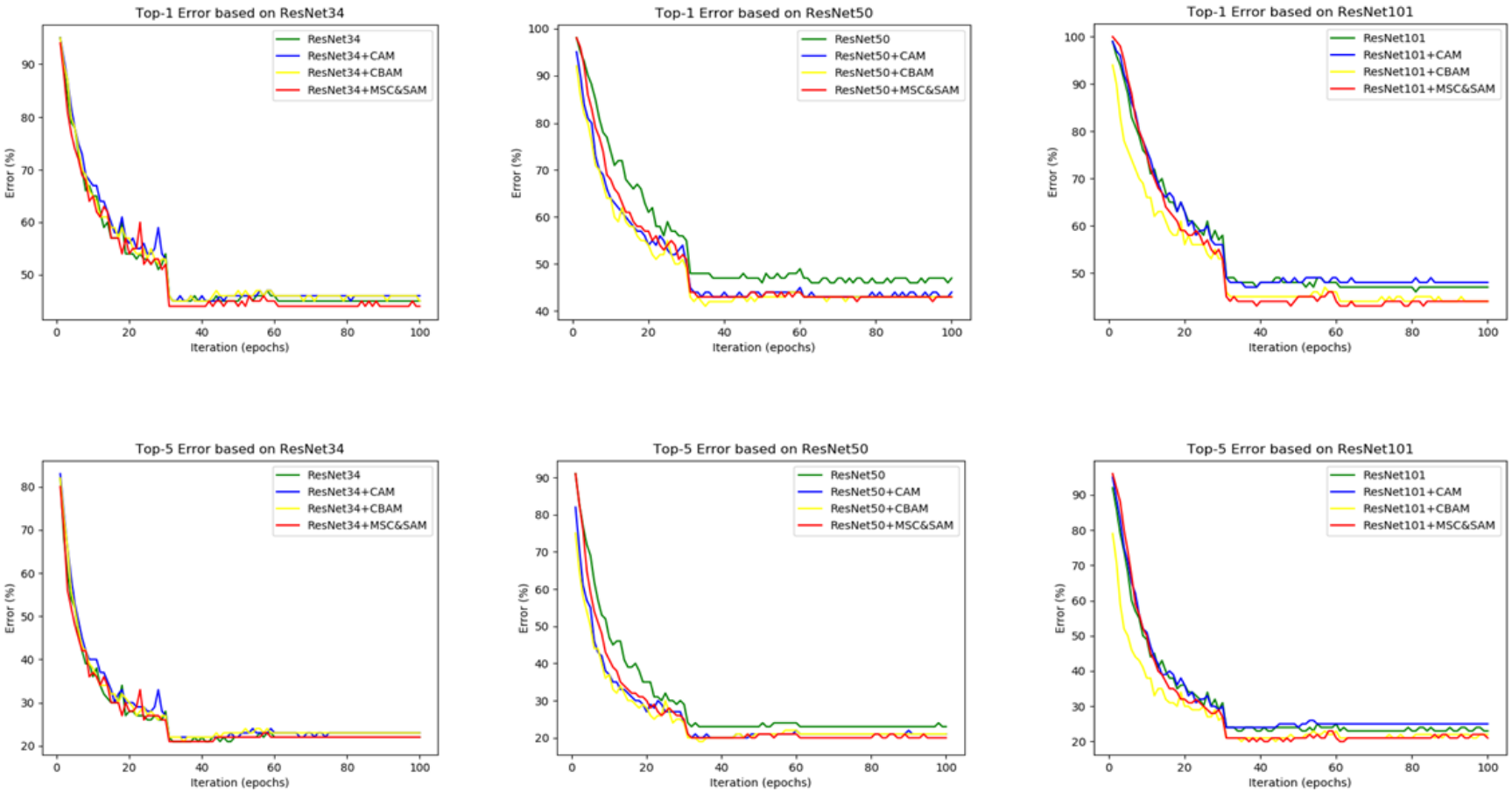


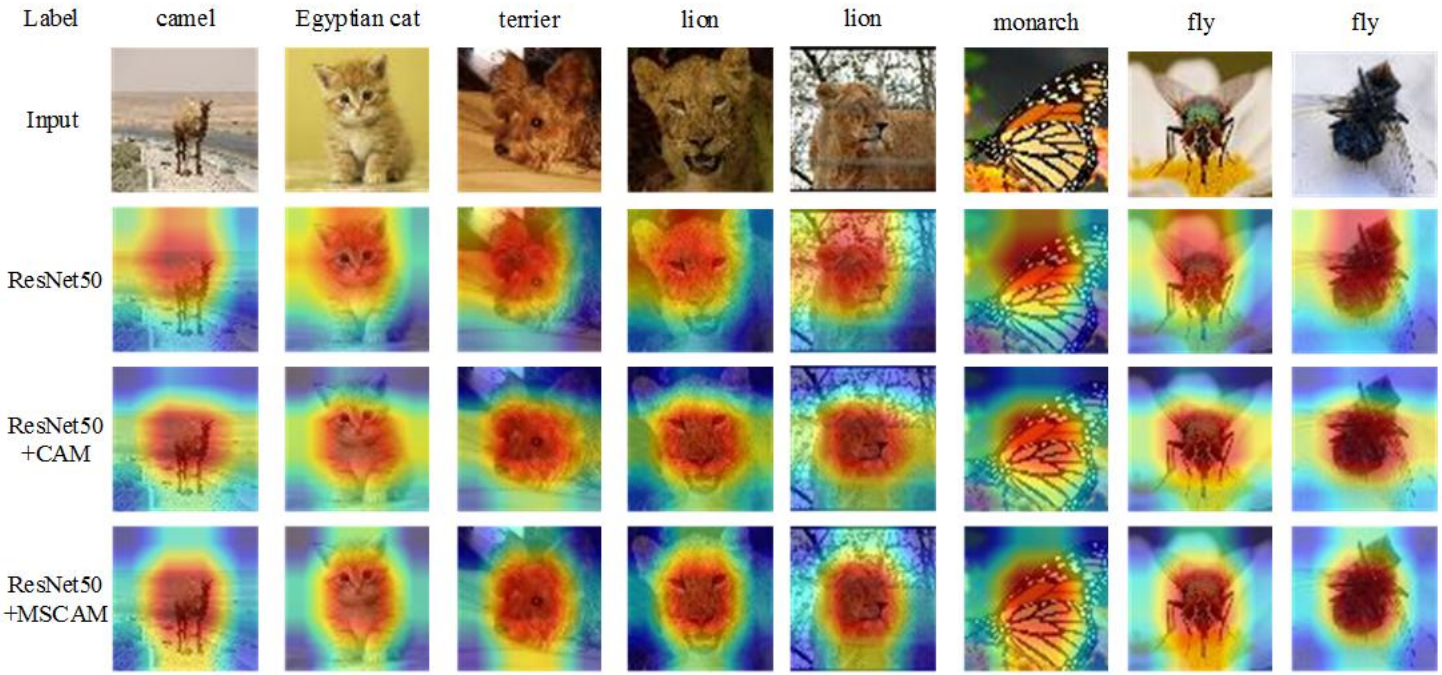
FIG.4.ERROR CURVES DURING TRAINING PROCESS ON TINY-IMAGENET DATASET.

Results

TABLE VI. ACCURACY RATES (%) COMPARISONS OF LIGHTWEIGHT NETWORKS ON VARIOUS DATASETS

Network	**CIFAR10**	**CIFAR100**	**Tiny-ImageNet**
	Top-1 err. *(%)*| ***params.*** *(M)*	***Top-1 err.*** *(%)* | ***params.*** *(M)*	***Top-1 err.*** *(%)* | ***Top-5 err.*** *(%)* | ***params.*** *(M)*
SqueezeNet	11.66|**0.73**	31.09|**0.78**	46.44|21.43|**0.83**
SqueezeNet+CAM[10]	11.40|0.86	29.61|0.91	45.33|20.52|0.91
SqueezeNet+CBAM[11]	11.81|0.86	31.55|0.91	46.87|21.25|0.91
SqueezeNet+MSCAM	**10.01**|1.84	**29.19**|1.89	**43.54**|**19.19**|1.94
MobileNetV1	13.63|**3.22**	34.57|3.32	42.31|19.66|**3.43**
MobileNetV1+CAM[10]	9.94|3.40	34.73|3.49	43.78|20.20|3.59
MobileNetV1+CBAM[11]	12.53|3.40	33.89|3.49	43.27|19.84|3.59
MobileNetV1+MSCAM	**9.90**|7.93	**32.91**|8.02	**42.11**|**19.03**|8.13

Visualizaiton results



Thank you