Frequency Decomposition to Tap the Potential of Single Domain for Generalization
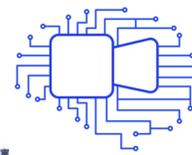
Hongjing Niu, Qingyue Yang, Pengfei Xia, Wei Zhang,
Bin Li Feng Zhao,

University of Science and Technology of China

Overview

- We found that each frequency component contains effective information that cannot be ignored, but not all of them are learned by deep learning models.

- Based on the observation, we propose a new single source domain generalization method to better learn the effective features contained in each frequency band.

Intuition

Deep learning models can not learn all the effective features in each frequency band. Such an insufficient learning has resulted in poor generalization performance of the model and the proposed method solved this problem.
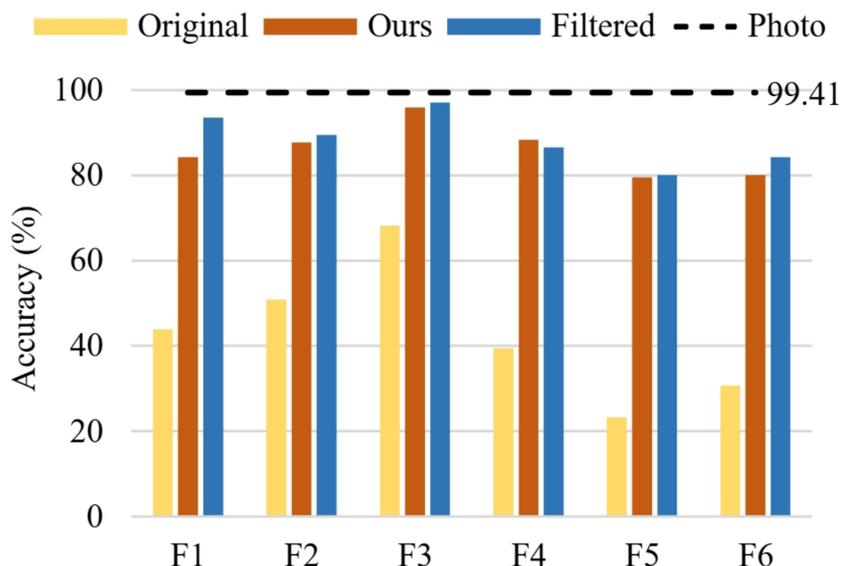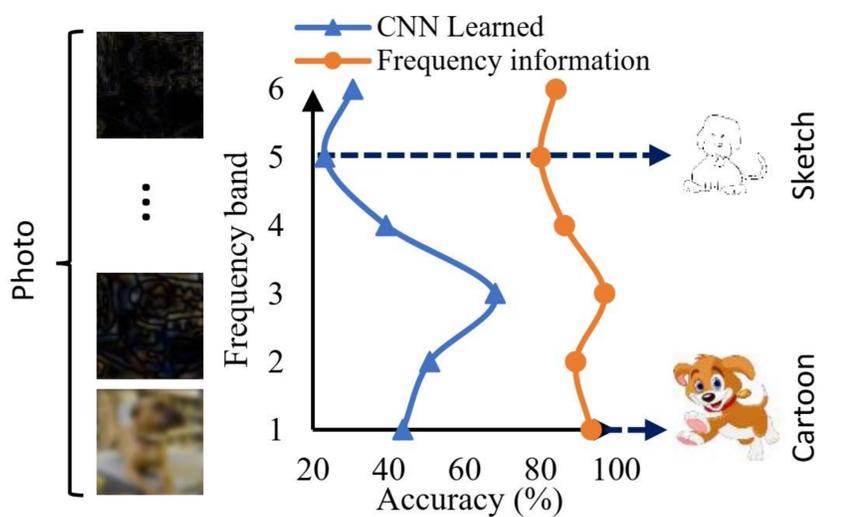
Experiments.
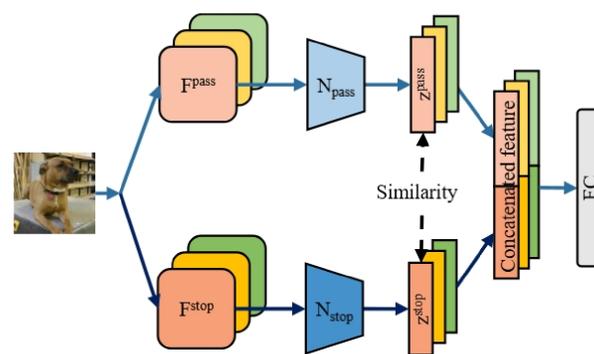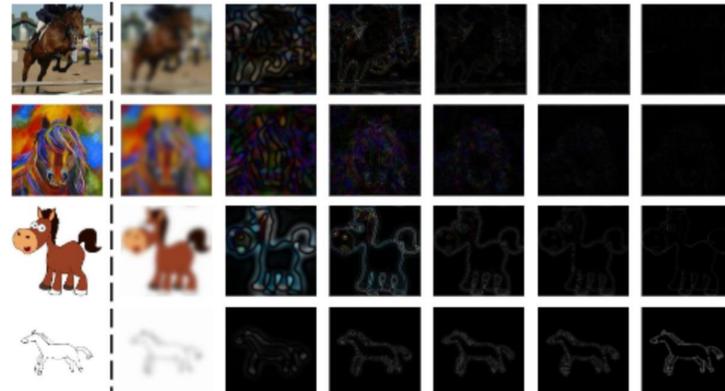
We utilized frequency decompositon to get training samples in data from single domain.

We propose a network, with two branches receiving training data from different frequency bands.

Method	P	A	C	S	Avg.
ERM [33]	42.2	70.9	76.5	53.10	60.7
MixStyle [44]	41.2	61.9	71.5	32.2	51.7
EFDMix [41]	42.5	63.2	73.9	38.1	54.4
RSC [15]	41.63	70.67	75.08	47.25	58.66
SelfReg [18]	43.46	72.59	76.56	45.76	59.59
L2D [36]	52.29	76.91	77.88	53.66	65.18
ASR [8]	54.6	76.7	**79.3**	**61.6**	68.1
ours	**64.52**	**79.91**	77.63	57.68	**68.94**

This method has significant advantages compared to other experimental methods

Acknowledgments