Few-shot learning

Chenchen Qiu

Vision Lab of OUC

February 28, 2018

Previous Works

1. Dataset
2. Structure
3. Refined SE Block
4. Pre-pre-training

Dataset

Dataset 1

Species	Number of images
(a) Chromis chromis	106
(b) Coris julis female	57
(c) Coris julis male	57
(d) Diplodus annularis	94
(e) Diplodus vulgaris	111
(f) Oblada melanura	57
(g) Serranus scriba	56
(h) Spondyliosoma cantharus	51
(i) Spicara maena	49
(j) Symphodus melanocercus	105
(k) Symphodus tinca	34
(l) Sarpa salpa	17
Total	794

Problem

- Quantity
- Quality

(1) *Corisjulis female* (2) *Corisjulis male* (3) *Spicaramaena* (4) *Symphodus meanocercus*

Figure: Croatian Fish Dataset

Dataset

Dataset 2

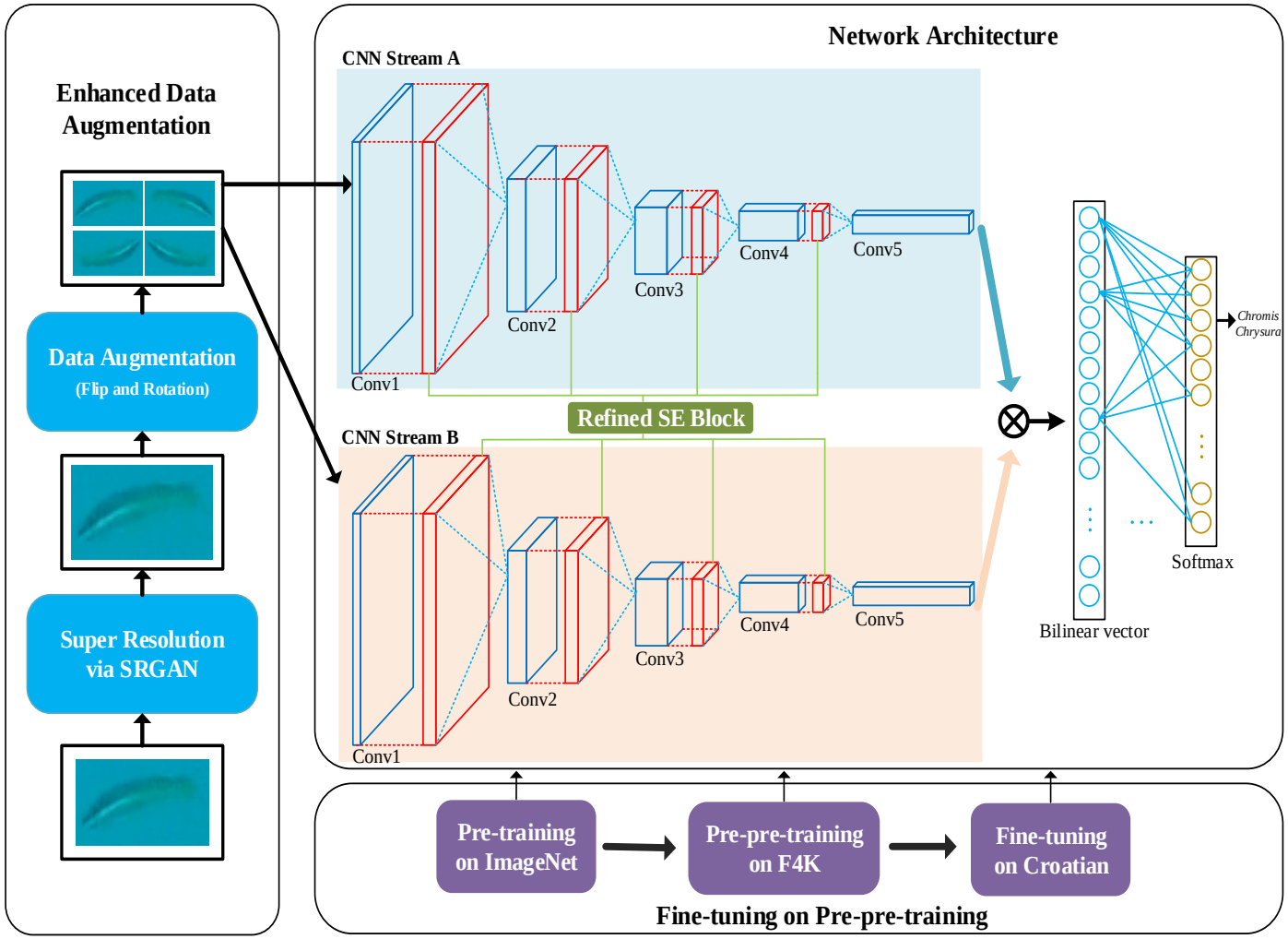
ID	Species	Number
1	Dascyllus reticulatus	12,112
2	Plectroglyphidodon dickii	2683
3	Chromis chrysura	3593
4	Amphiprion clarkii	4049
5	Chaetodon lunulatus	2534
6	Chaetodon trifascialis	190
7	Myripristis kuntee	450
8	Acanthurus nigrofuscus	218
9	Hemigymnus fasciatus	241
10	Neoniphon sammara	299
11	Abudefduf vaigiensis	98
12	Canthigaster valentini	147
13	Pomacentrus moluccensis	181
14	Zebrasoma scopas	90
15	Hemigymnus melapterus	42
16	Lutjanus fulvus	206
17	Scolopsis bilineata	49
18	Scaridae	56
19	Pempheris vanicolensis	29
20	Zanclus cornutus	21
21	Neoglyphidodon nigroris	16
22	Balistapus undulatus	41
23	Siganus fuscescens	25
Total		22,370

Characteristics

- Adequate Quantity
- Clear Photos
- High Accuracy

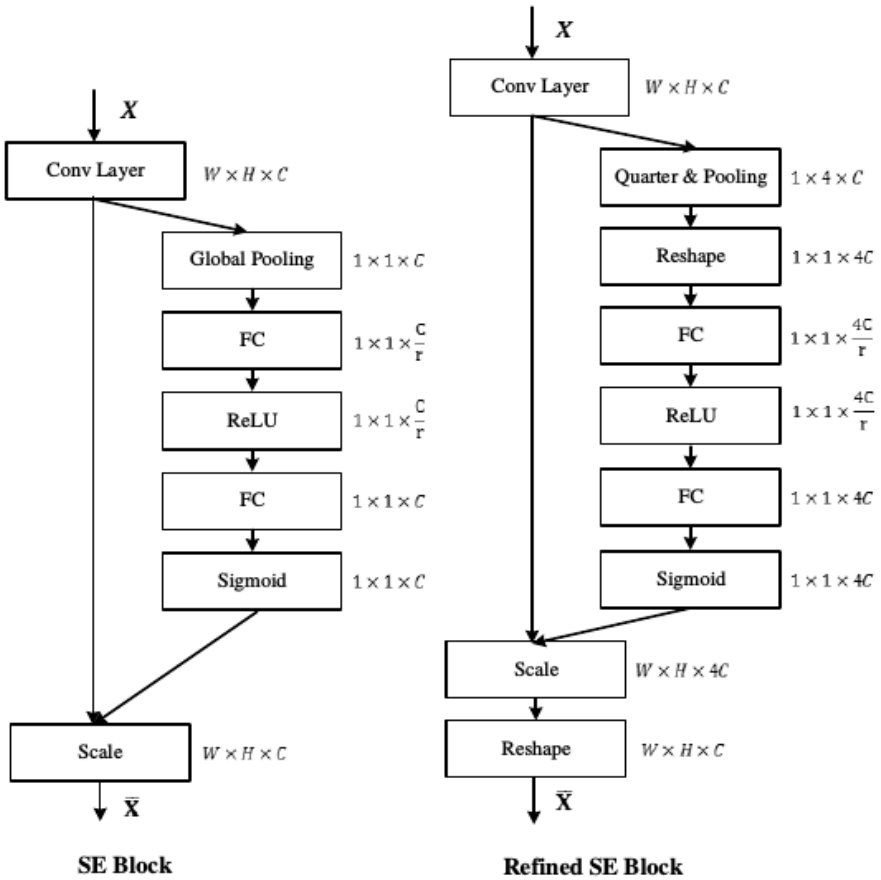
Figure: F4K Fish Dataset

Complete Classification Pipeline



Refined SE block

Illustration of SE block and refined SE block



Compared Experiments

The Compared Experiments of B-CNNs

Network	Enhanced Data Augmentation		Accuracy
	Data Augmentation	SRGAN	Croatian
B-CNNs			81.30%
	√		83.36%
		√	82.56%
	√	√	**83.52%**
B-CNNs+ SE blocks			82.26%
	√		83.52%
		√	82.92%
	√	√	**83.78%**
B-CNNs+ refined SE blocks			82.50%
	√		83.56%
		√	83.30%
	√	√	**83.92%**

Compared Experiments

Benchmark of Popular CNNs

Network	Pre-trained model		Accuracy
	ImageNet	F4K	Croatian
AlexNet			53.42%
	✓		61.46%
		✓	45.01%
	✓	✓	**62.35%**
VGG-16			57.74%
	✓		67.10%
		✓	64.47%
	✓	✓	**72.07%**
Inception-v4			42.97%
	✓		74.26%
		✓	64.37%
	✓	✓	**78.25%**
ResNet-50			71.78%
	✓		76.02%
		✓	79.24%
	✓	✓	**80.10%**

Next Step

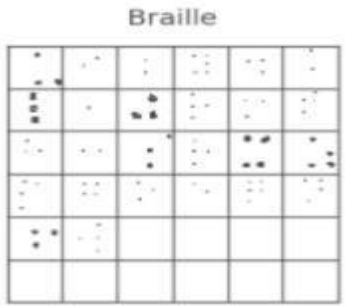
Few-shot Learning

- Dataset

  Mini-ImageNet

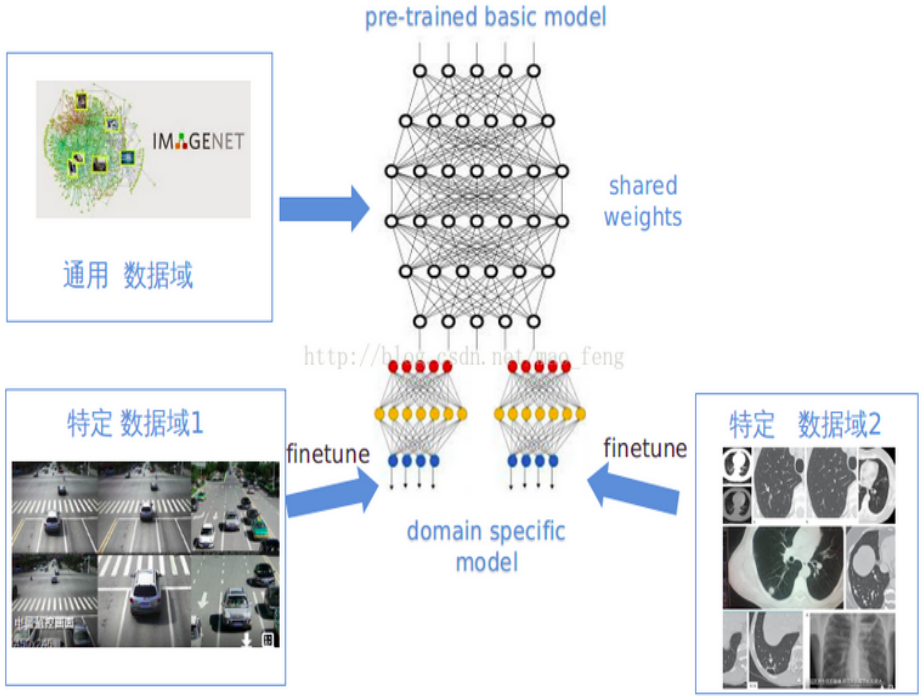
  Omniglot

- Methods
- Plans



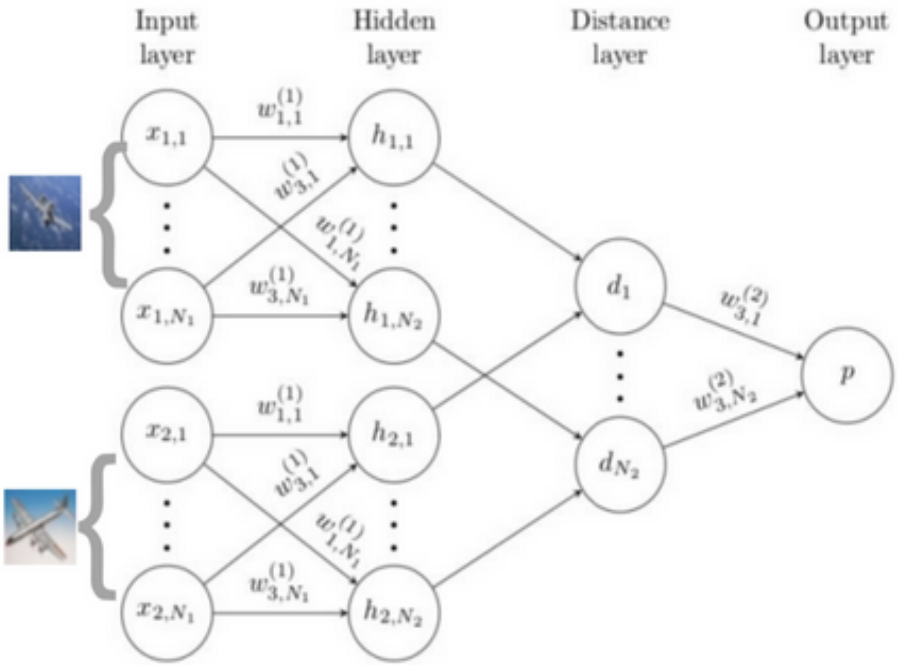
Methods

- Fine-tune
- Metric
- Graph Neural Network
- Meta learning

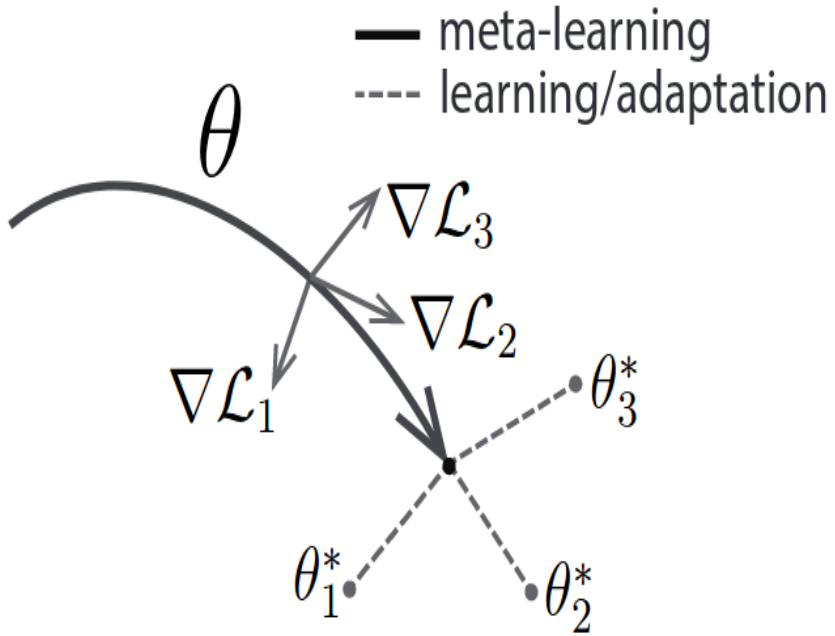


Meta Learning

Siamese Neural Network



Model-Agnostic



Plan

- Read papers about meta learning and few-shot learning
- Try to run some programs
- do something different

Q & A