

## ORBIT Few-Shot Object Recognition Challenge 2022

## **Team: Canada-goose**



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\* denotes equal contribution

#### **Our Solution – Overview**





**Query Prediction** 

## **Our Solution – FEAT[1]**







#### Visualization of embedding adaptation on ORBIT dataset using T-SNE.



[1] Ye, Han-Jia, et al. "Few-shot learning via embedding adaptation with set-to-set functions." Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2020.

## **Our Solution -- Uniform Clip Sampler**

#### **\*** Random Clip Sampler:





## **Our Solution -- Invalid Frame Detection**

(a) Normal Frames



- Canny edge detector is used to detect the frames without objects presented.
- Frames without objects are then removed from support set.



(b) Blurry Frames

(c) Frames without objects

## **Our Solution -- High-quality Code**

#### ✤ Modularity





## **Our Solution --** High-quality Code

- Compatibility
- Be interoperable with PyTorch standard domain specific libraries, e.g. torchvision
- Apply similar API to follow common usage in standard supervised learning: Use `torch.utils.data.Dataset` to prepare tensors

Use `torch.utils.data.DataLoader` to handle batching, shuffling and perfecting



- Performance
- Use the multithreading to hide the latency of loading video frames from the disk.
- Use 100% of GPU to accelerate the training and the testing.





#### **Performance Benchmark**



*Training	# workers	# threads	Total times per episode (s)
Original ORBIT Codebase	4	1	2.61
Ours	4	4	2.20 (1.18x)
Ours	4	16	1.08 (2.41x)
Ours	8	16	0.94 (2.77x)

*Testing	# workers	# threads	Total times (s)
Original ORBIT Codebase	4	1	233
Ours	4	4	201 (1.15x)
Ours	4	16	152 (1.53x)
Ours	8	16	86 (2.70x)

\* Training: Average time of preparing tensors of 100 episodes

\* Testing: Total time of preparing 300 testing videos from 17 users

#### **Our Results**



#### Quantitative Results

	Support Clip Sampler	Data Augmentation	Invalid Frame Detection	Frame Accuracy
ProtoNet (Official)	Random	Ν	Ν	65.00 (-1.27)
ProtoNet (Ours)	Random	Ν	Ν	66.27
FEAT Baseline	Uniform	Ν	Ν	69.17 (+2.90)
FEAT + Uniform	Uniform	Ν	Ν	70.69 (+4.42)
FEAT + Aug + Uniform	Uniform	Y	Ν	71.57 (+5.30)
Ours	Uniform	Y	Y	71.69 (+5.42)

#### **Our Results**

 Quantitative improvements of each user





# Thank you!

