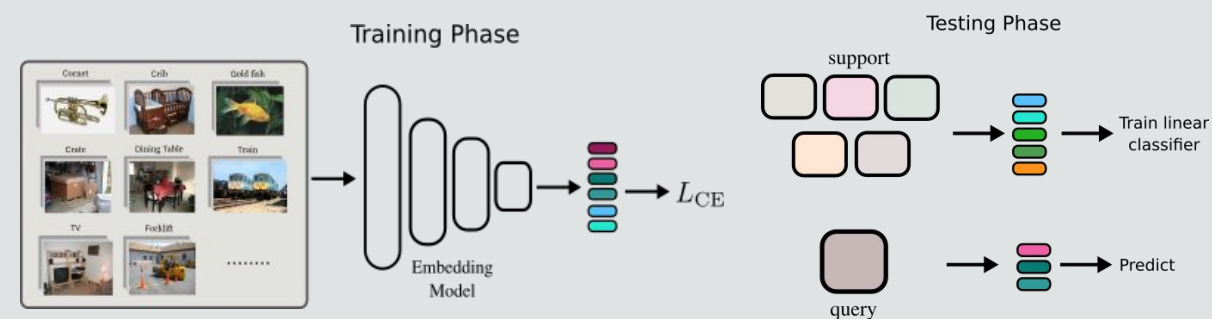




→ **Summary:** In this work, we explore contrastive learning for few-shot classification, in which we propose a novel spatial contrastive loss, and use it as an additional auxiliary training objective acting as a data-dependent regularizer to promote more general and transferable features.

Transfer Learning Baseline

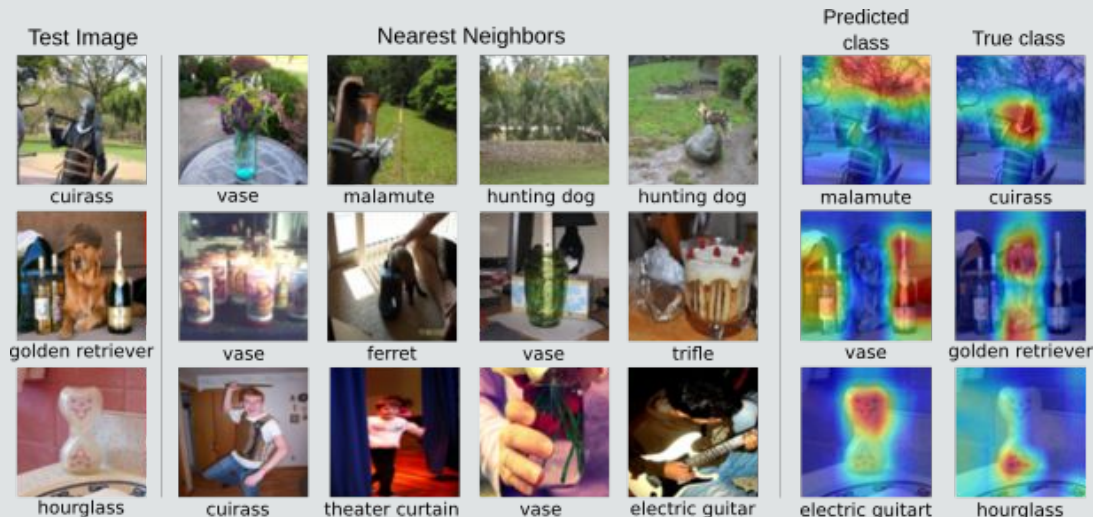
A simple baseline for few-shot classification that highlights the importance of learning general purpose representations in the training phase.



→ Is the Cross-Entropy loss a good objective for learning such representations?

Nearest Neighbours Analysis

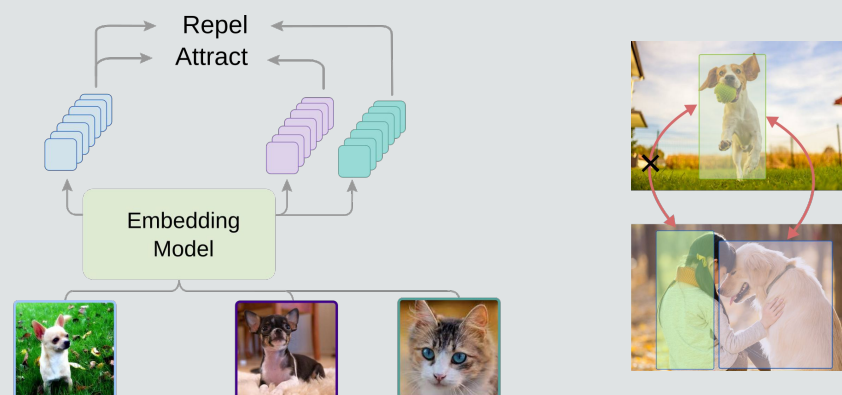
For fast test-time adaptation, the test samples need to be semantically similar to their neighbors in the embedding space.



The nearest neighbors are semantically dissimilar.
→ The learned embeddings are excessively discriminative towards training classes, limiting their usefulness for test time classification.

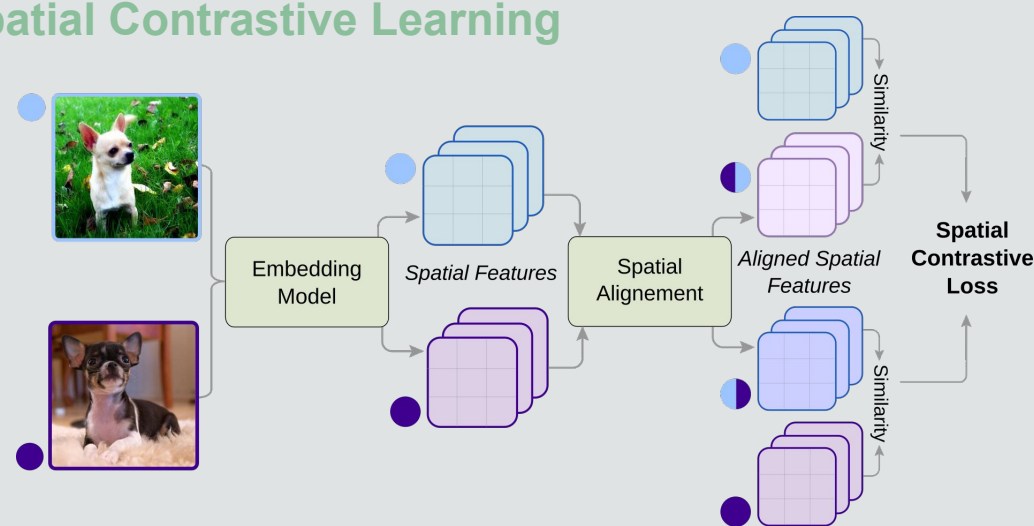
Contrastive Learning

Exploring contrastive learning to learn better representations.
Objective: Pull the features of images of similar class and push away those of different classes in the embedding space.

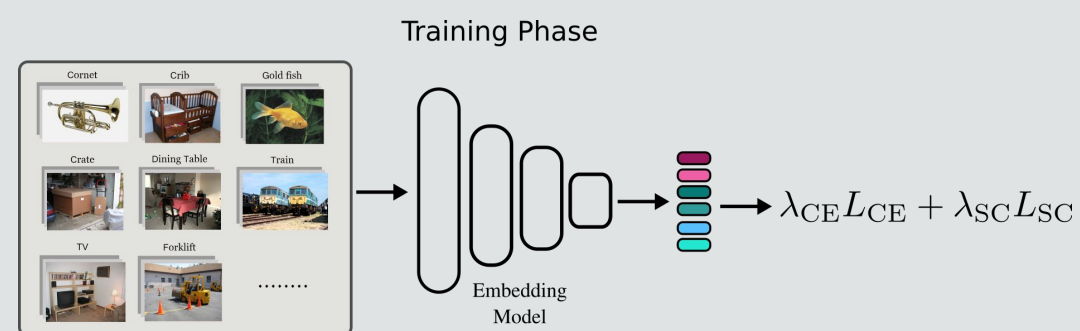


However, we might align irrelevant objects when using global features.
→ Use spatial features in the contrastive loss.

Spatial Contrastive Learning



→ Integrate this loss into the learning framework.

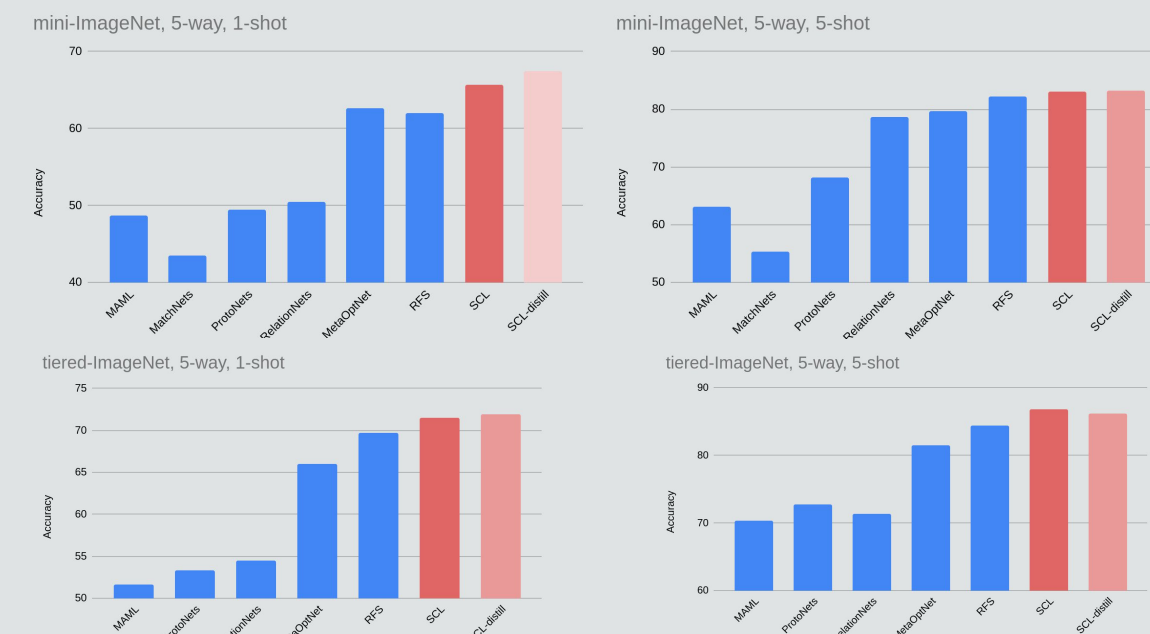


Results

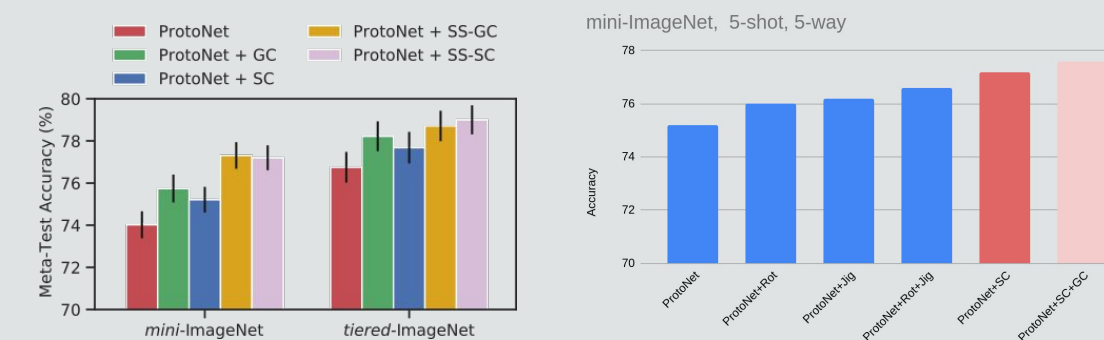
Ablation study with different training objectives.

Loss Function	Aug.	mini-ImageNet, 5-way		CIFAR-CS, 5-way	
		1-shot	5-shot	1-shot	5-shot
CE		61.8 ± 0.7	79.7 ± 0.6	71.3 ± 0.9	86.1 ± 0.6
CE	✓	61.8 ± 0.8	78.6 ± 0.5	71.9 ± 0.9	86.3 ± 0.5
CE + SS-GC	✓	62.7 ± 0.7	81.0 ± 0.6	70.9 ± 0.9	84.5 ± 0.6
CE + SS-SC	✓	64.0 ± 0.8	81.5 ± 0.5	72.1 ± 0.8	86.2 ± 0.6
CE + SS-GC + SS-SC	✓	62.8 ± 0.8	81.1 ± 0.6	69.0 ± 0.9	85.0 ± 0.6
CE + GC	✓	65.0 ± 0.8	81.6 ± 0.5	74.0 ± 0.8	87.3 ± 0.6
CE + SC	✓	65.7 ± 0.8	82.5 ± 0.5	75.0 ± 0.9	87.4 ± 0.6
CE + GC + SC	✓	65.0 ± 0.8	81.3 ± 0.5	76.0 ± 0.7	87.5 ± 0.5

Results on ImageNet derivatives.



SCL integrated into Prototypical Networks framework.



→ For more details please refer to our paper and code (QR code above).