AI POWER !

Team Members

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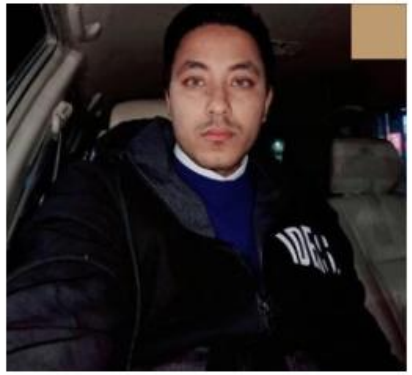


Abdulrahman Muhammed

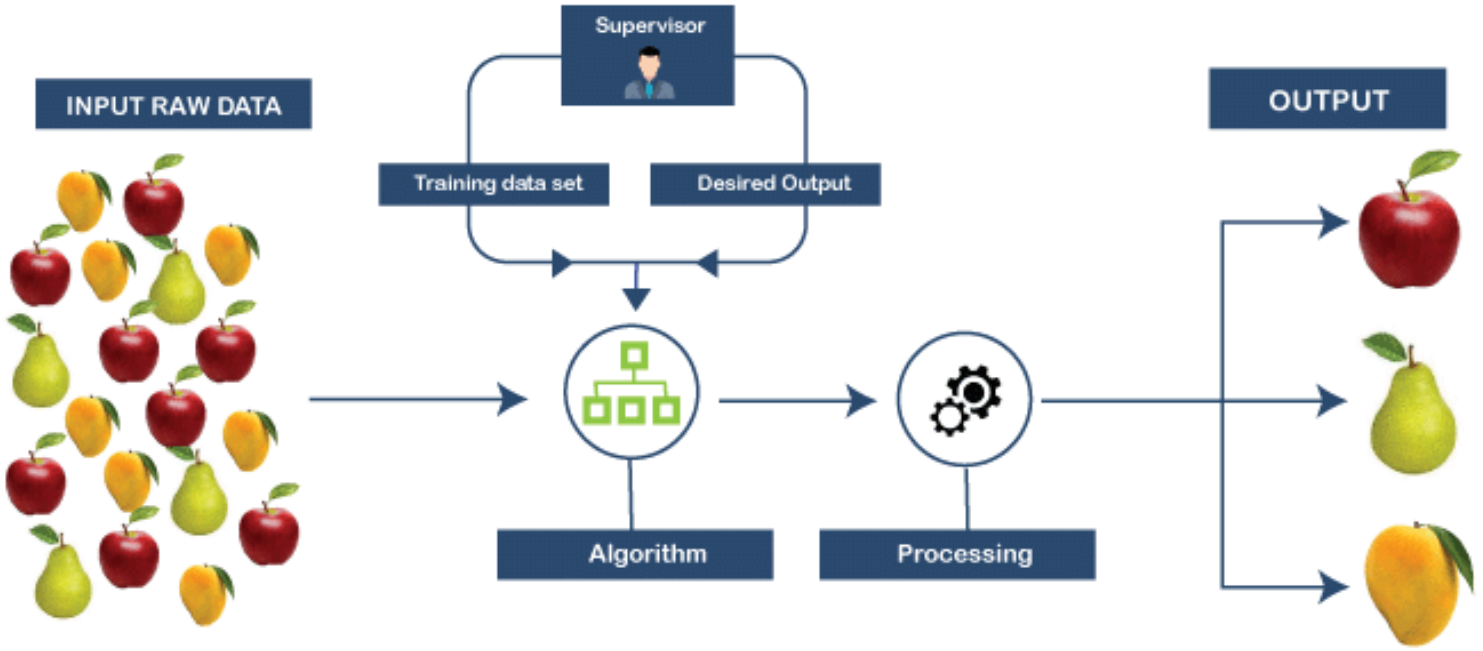
Ahmed Abd Ellatife

Supervise learning

Ordinary Supervise learning techniques requires a huge amount of data to cover and solve specific task with high accuracy.

Imitations :

- fail with few datasets
- in classification problems, the number of classes should be fixed.
- data unbalancing problem.
- one solution for one task.



Challenges

- In case of not enough data to solve the task “if we have two image for each class”
- Number of classes that you want to predict are not fixed “increase over time “
- Can we solve multi-tasking problems using the same model ?

To tackle those problems we used sub-field of meta learning called. "**few-shot learning**"

What is meta learning

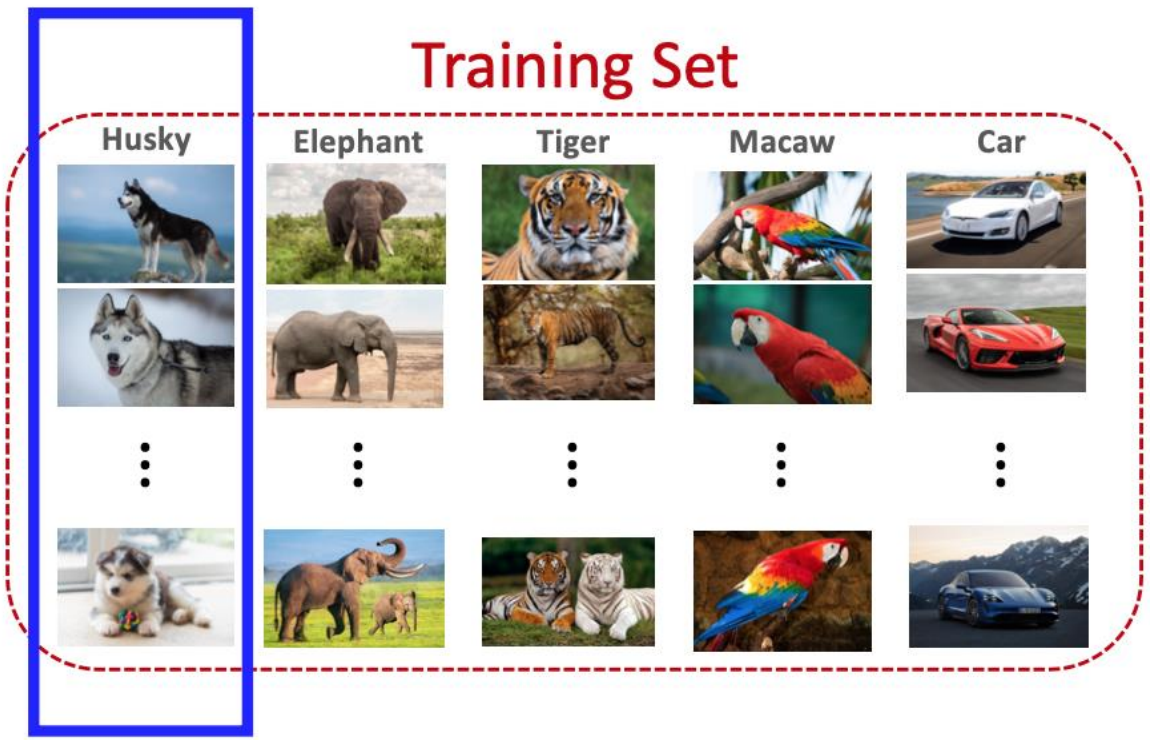
Meta-learning in machine learning refers to learning algorithms that learn from other learning algorithms.

Meta-learning, or learning to learn, is the science of systematically observing how different machine learning approaches perform on a wide range of learning tasks, and then learning from this experience, or meta-data, to learn new tasks much faster than otherwise possible

Few-Shot Learning is an example of meta-learning, where a learner is trained on several related tasks, during the meta-training phase, so that it can generalize well to unseen (but related) tasks with just few examples, during the meta-testing phase. An effective approach to the Few-Shot Learning problem is to learn a common representation for various tasks and train task specific classifiers on top of this representation.

Supervised Learning vs. Few-Shot Learning

- Traditional supervised learning:
  - Test samples are never seen before.
  - Test samples are from known classes.

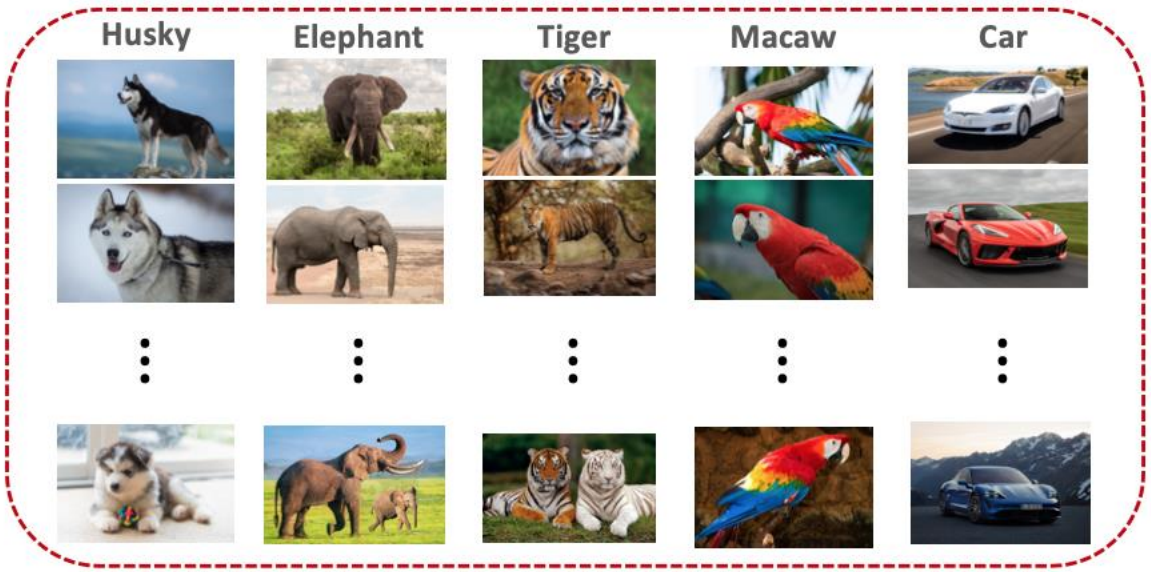


Test Sample

Supervised Learning vs. Few-Shot Learning

- Few-shot learning:
  - Query samples are never seen before.
  - Query samples are from unknown classes.

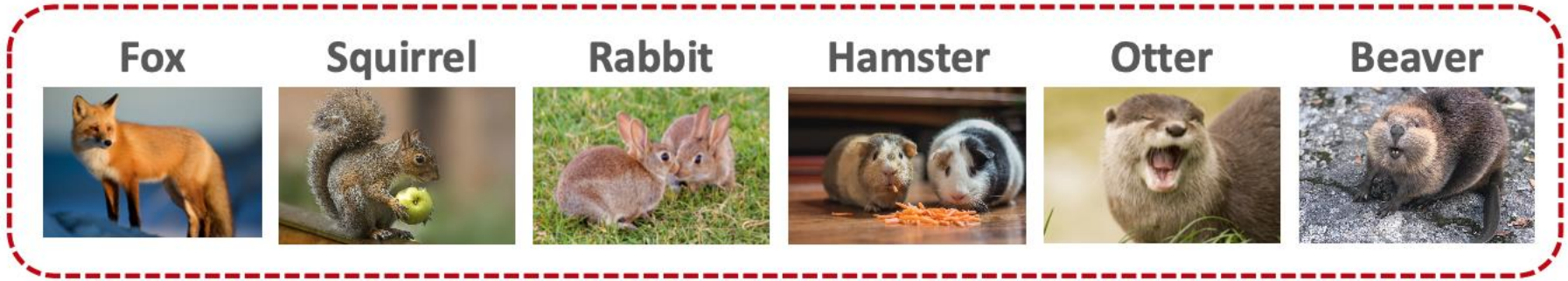
Training Set



Query Sample

k-way n-shot Support Set

Support Set:



- k-way: the support set has k classes.
- n-shot: every class has n samples.

Basic Idea

What is in the image?

Query:

Support Set:

Greyhound

Bulldog

Armadillo

Pangolin

Otter

Beaver

Basic Idea

What is in the image?

Query:

$\text{sim} = 0.2$

Greyhound

Bulldog

Armadillo

Pangolin

Otter

Beaver

Basic Idea

What is in the image?

Query:

$\text{sim} = 0.2$

$\text{sim} = 0.1$

Greyhound	Bulldog	Armadillo	Pangolin	Otter	Beaver
					

Basic Idea

What is in the image?

Query:

$\text{sim} = 0.2$ | $\text{sim} = 0.1$ | $\text{sim} = 0.03$

Greyhound	Bulldog	Armadillo	Pangolin	Otter	Beaver
					

Basic Idea

What is in the image?

Query:

sim = 0.2	sim = 0.1	sim = 0.03	sim = 0.05	sim = 0.7	sim = 0.5
Greyhound	Bulldog	Armadillo	Pangolin	Otter	Beaver
					

Basic Idea

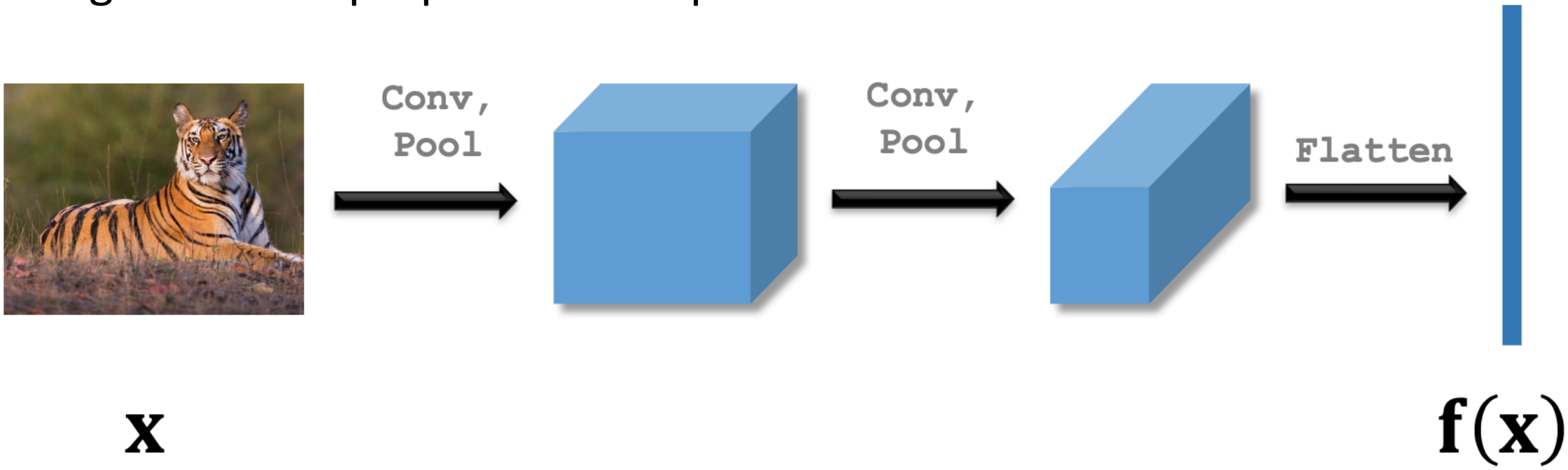
What is in the image?

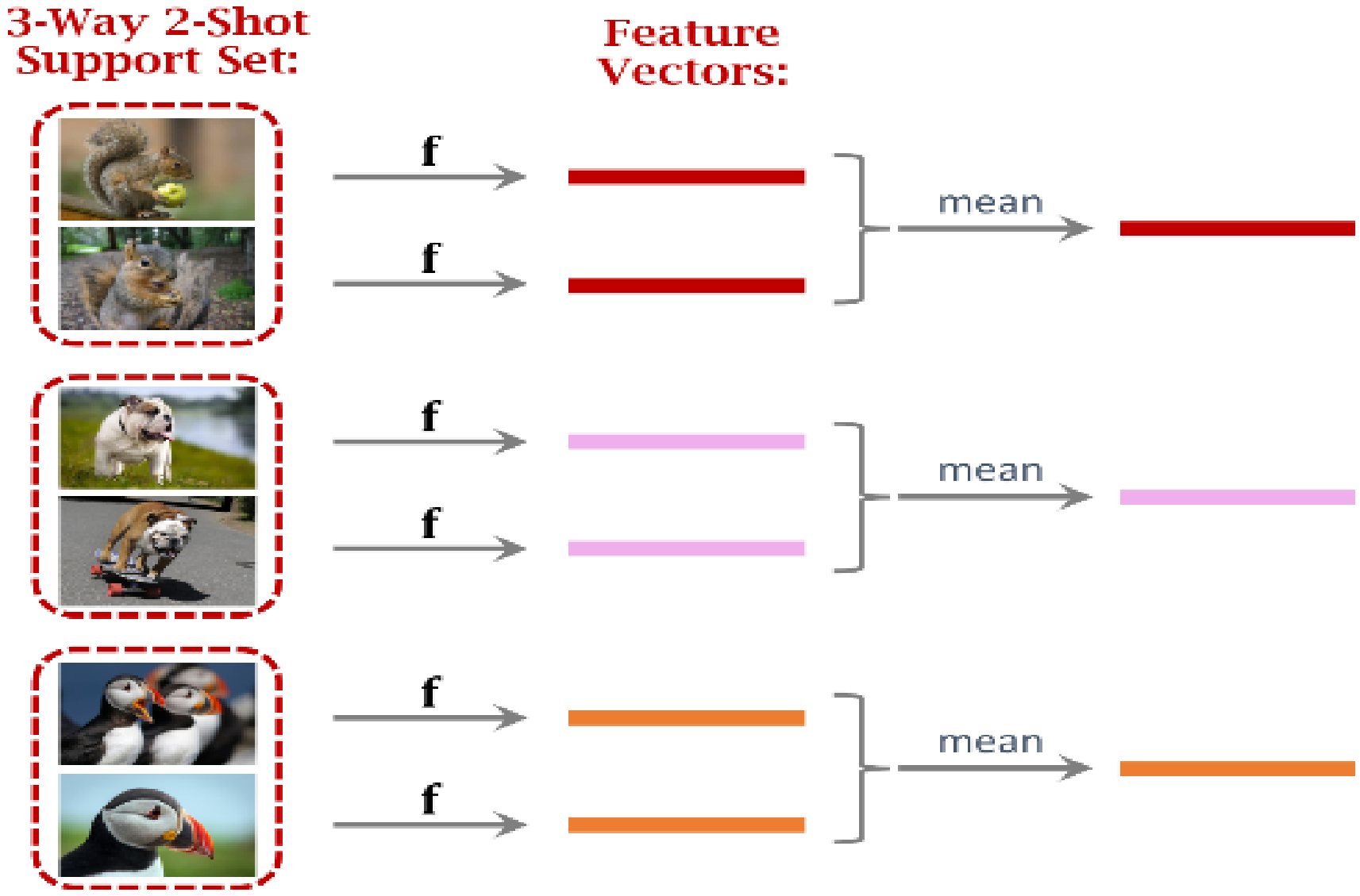
Query:

sim = 0.2	sim = 0.1	sim = 0.03	sim = 0.05	sim = 0.7	sim = 0.5
Greyhound	Bulldog	Armadillo	Pangolin	Otter	Beaver
					

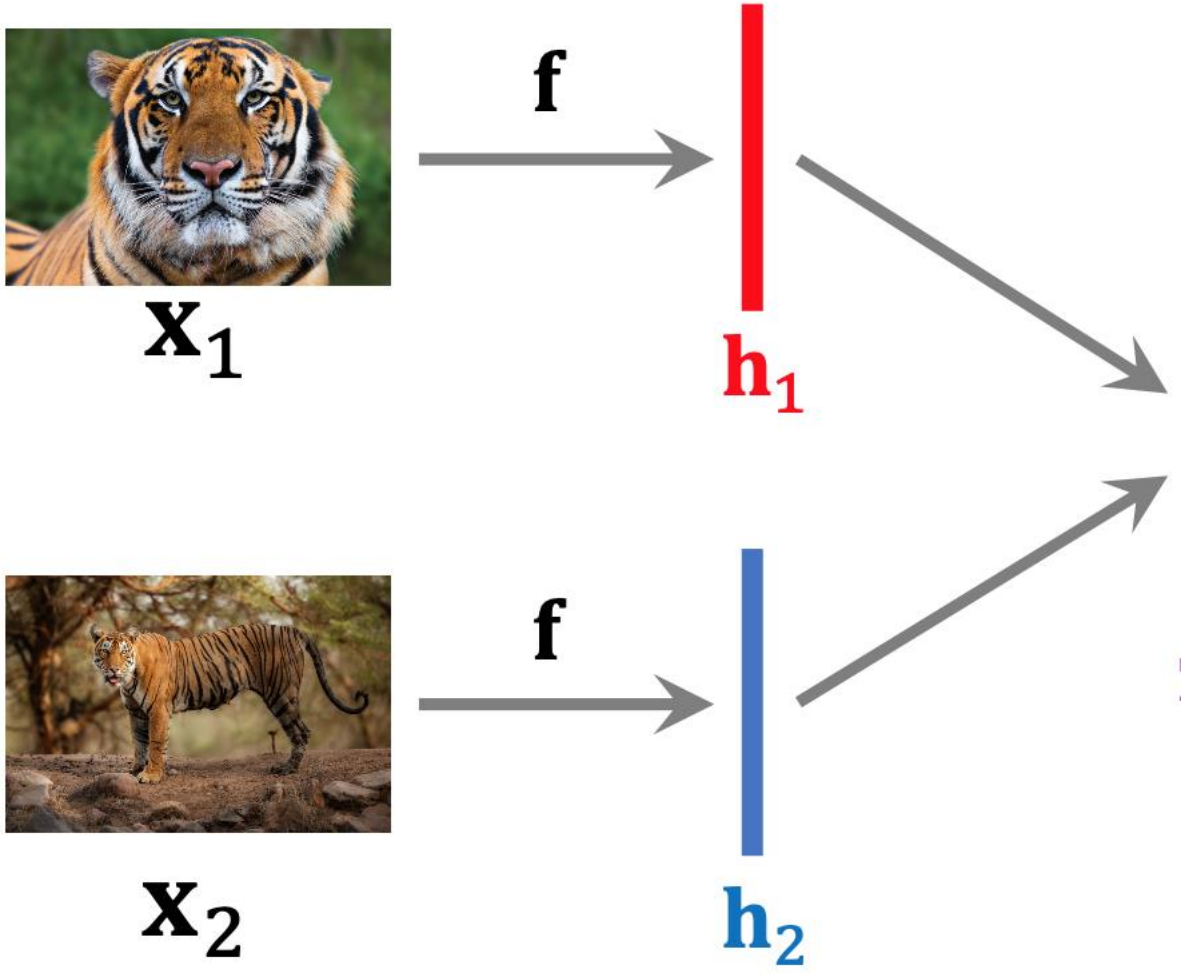
CNN for Feature Extraction

EfficientNetB0 was used as pre-trained model and used to map the image vector in proper feature space.




3-Way 2-Shot
Support Set:
Feature
Vectors:
f
f
mean
f
f
mean
f
f
mean

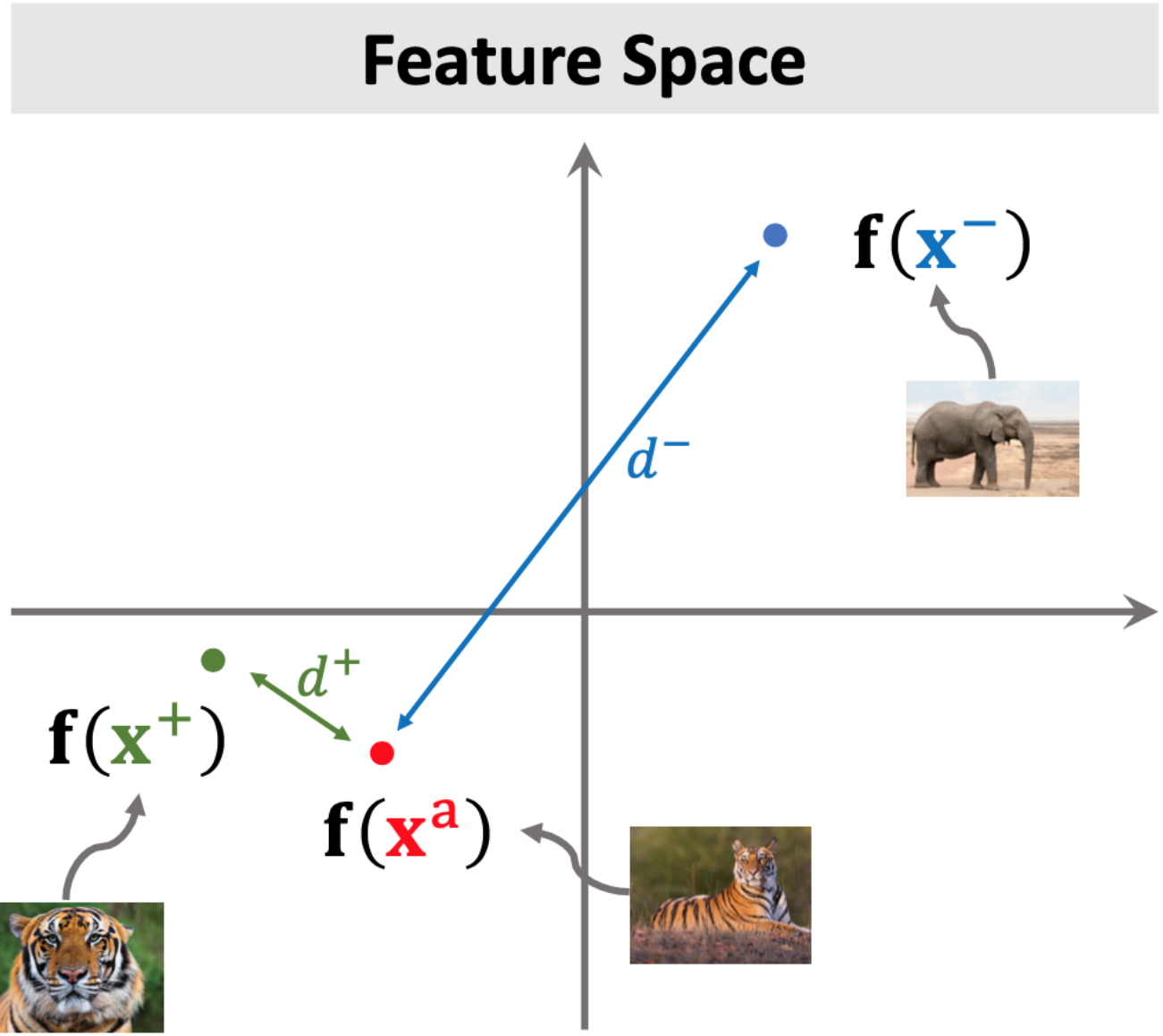
Similarity measurements



$\mathbf{x}^{+}$

$\mathbf{x}^{a}$

$\mathbf{x}^{-}$



Datasets

Omniglot :

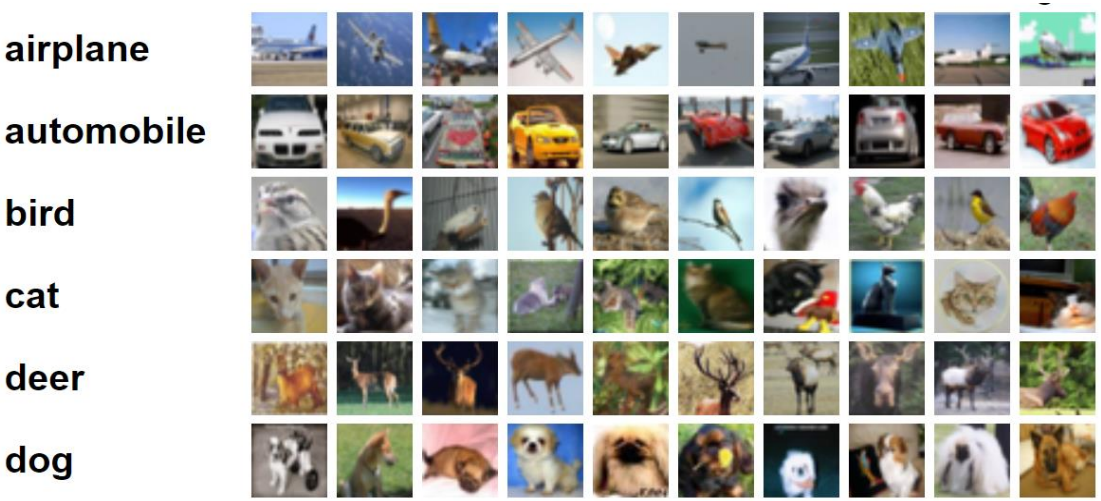
The Omniglot dataset is a dataset of 1,623 characters

taken from 50 different alphabets

CIFAR-10 :

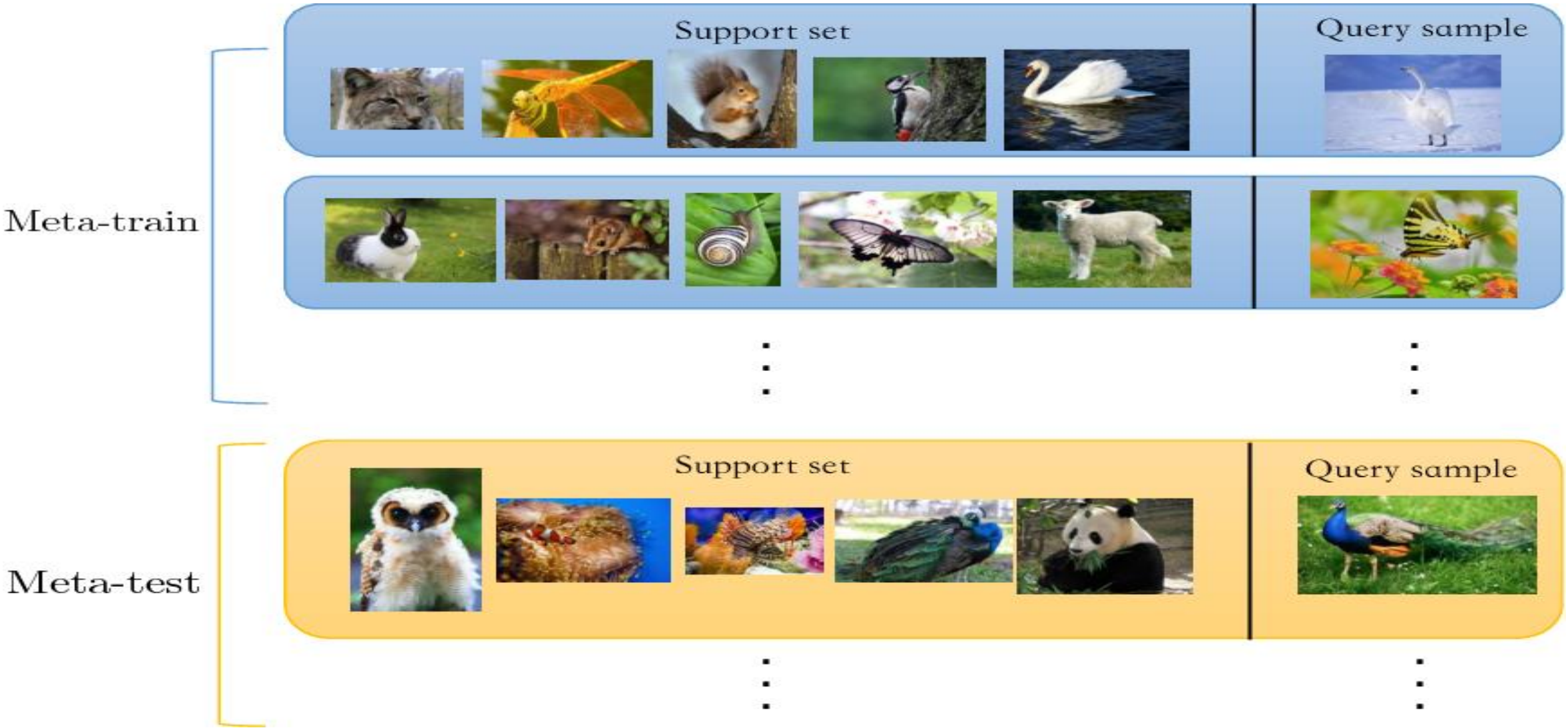
The CIFAR-10 dataset consists of 60000 Cifar10: 32x32

color images in 10 classes with 6000 images per class



For applying multitasking techniques we used the two datasets to benchmark the same model without making any modifications.

Preparing the dataset for meta-testing



We used 5 ways regularly with 50 **tasks**

Datasets	**Omniglot**		**CIFAR-10**	
N-Shots	EC	Cos-S	EC	Cos-S
1	52%	50%	26%	28%
5	58%	60%	38%	46%
10	66%	70%	42%	40%

Tools and Permalink of project

Tools:

- TensorFlow and tensorFlow datasets
- IBM WATSON Machine learning
- Cloud object storage

project link :

https://eu-de.dataplatform.cloud.ibm.com/analytics/notebooks/v2/16457ce1-b514-4efb-b4bf-7b9c08842f44/view?access_token=ac2956ad9f956faf781be956bc63a6cd8e70676d1f7d519b0d5b24b7402b9bea

References

- https://www.tensorflow.org/datasets/catalog/omniglot
- https://www.tensorflow.org/datasets/catalog/omniglot
- https://www.cs.toronto.edu/~kriz/cifar.html
- https://github.com/wangshusen/DeepLearning
- https://keras.io/examples/vision/reptile/#prepare-the-data
- https://www.tensorflow.org/datasets/catalog/cifar10

THANKS