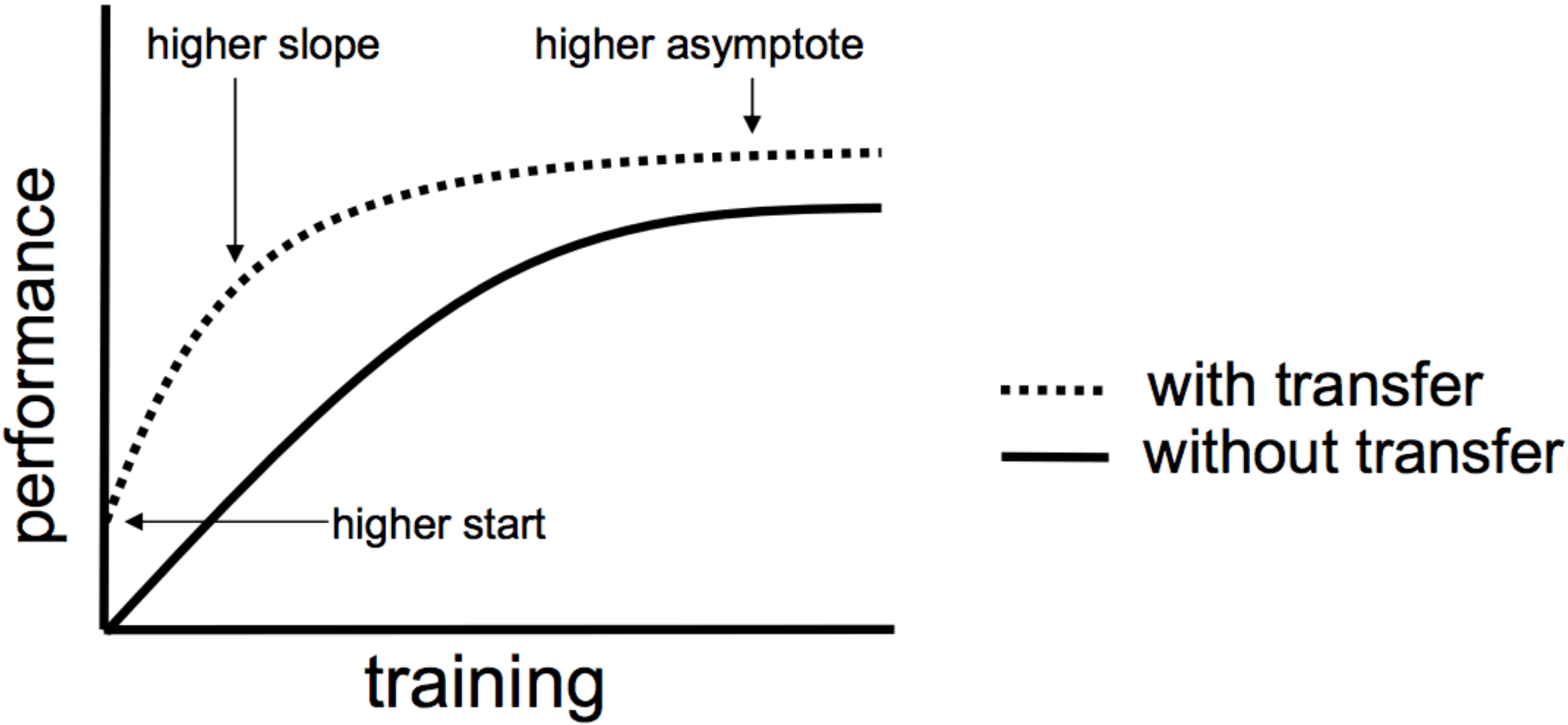
Transfer learning

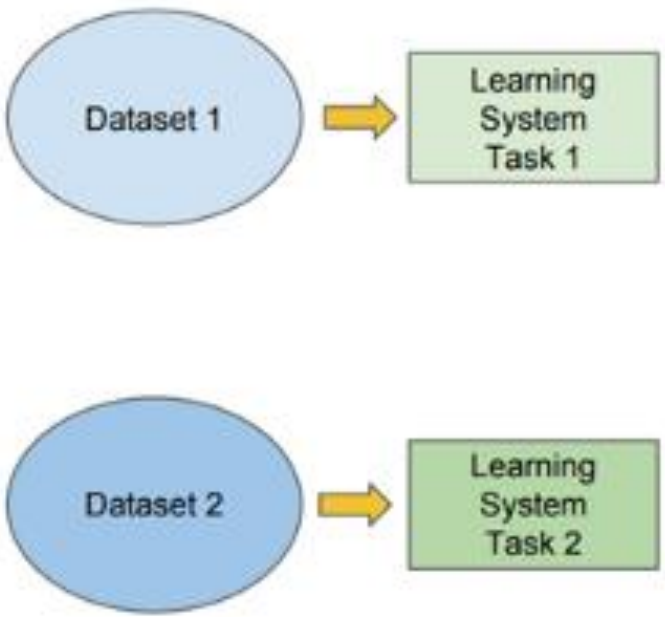
Weronika Hryniewska



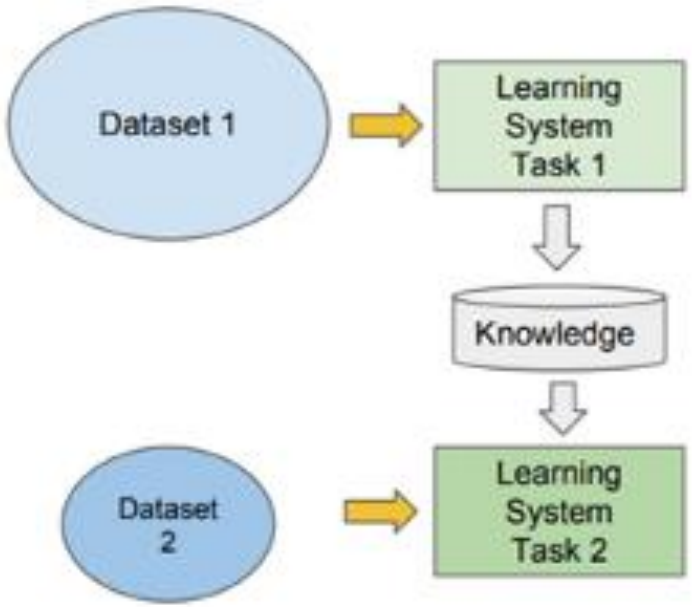
https://machinelearningmastery.com/transfer-learning-for-deep-learning

Traditional ML vs Transfer Learning

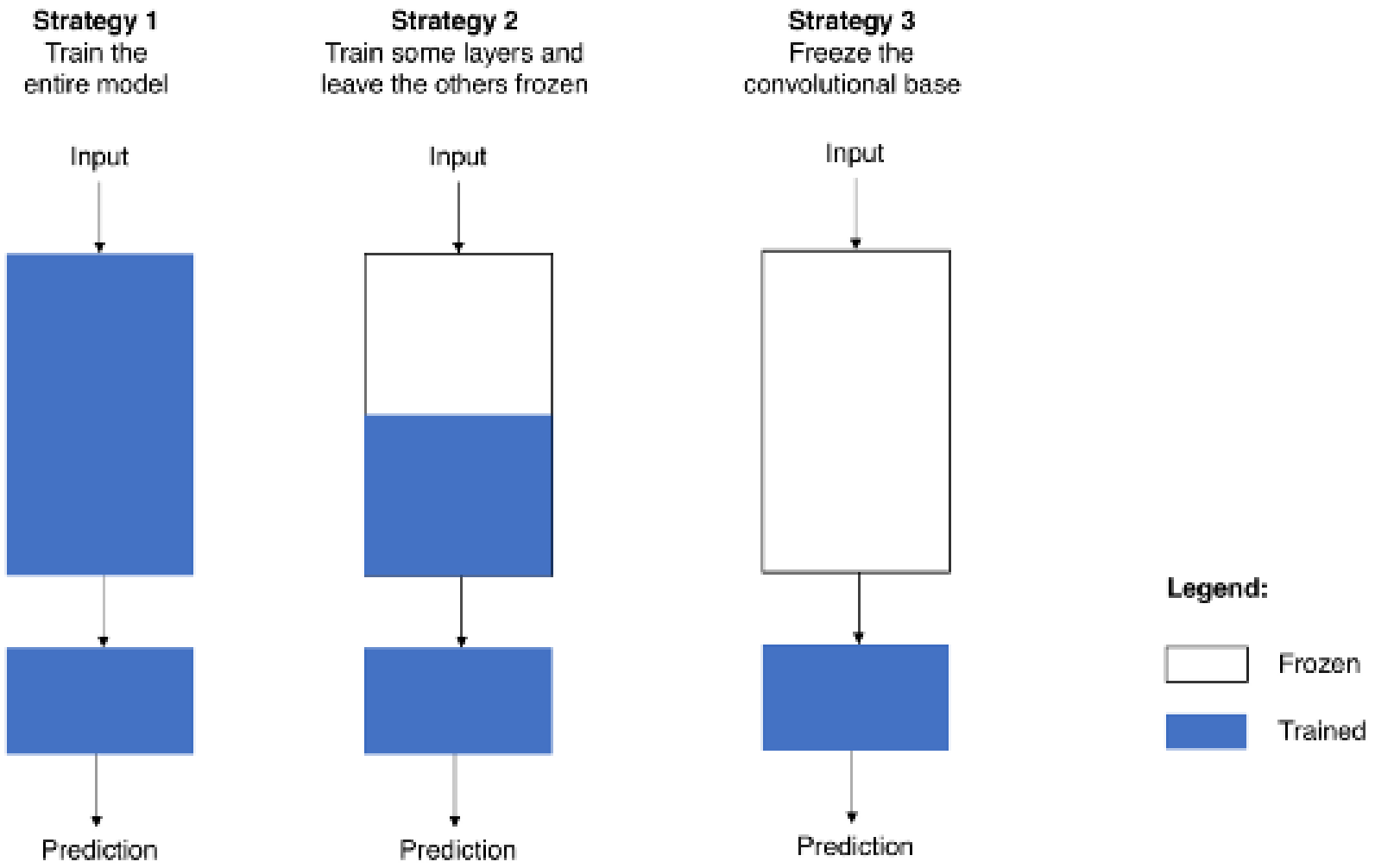
- Isolated, single task learning:
  - Knowledge is not retained or accumulated. Learning is performed w.o. considering past learned knowledge in other tasks



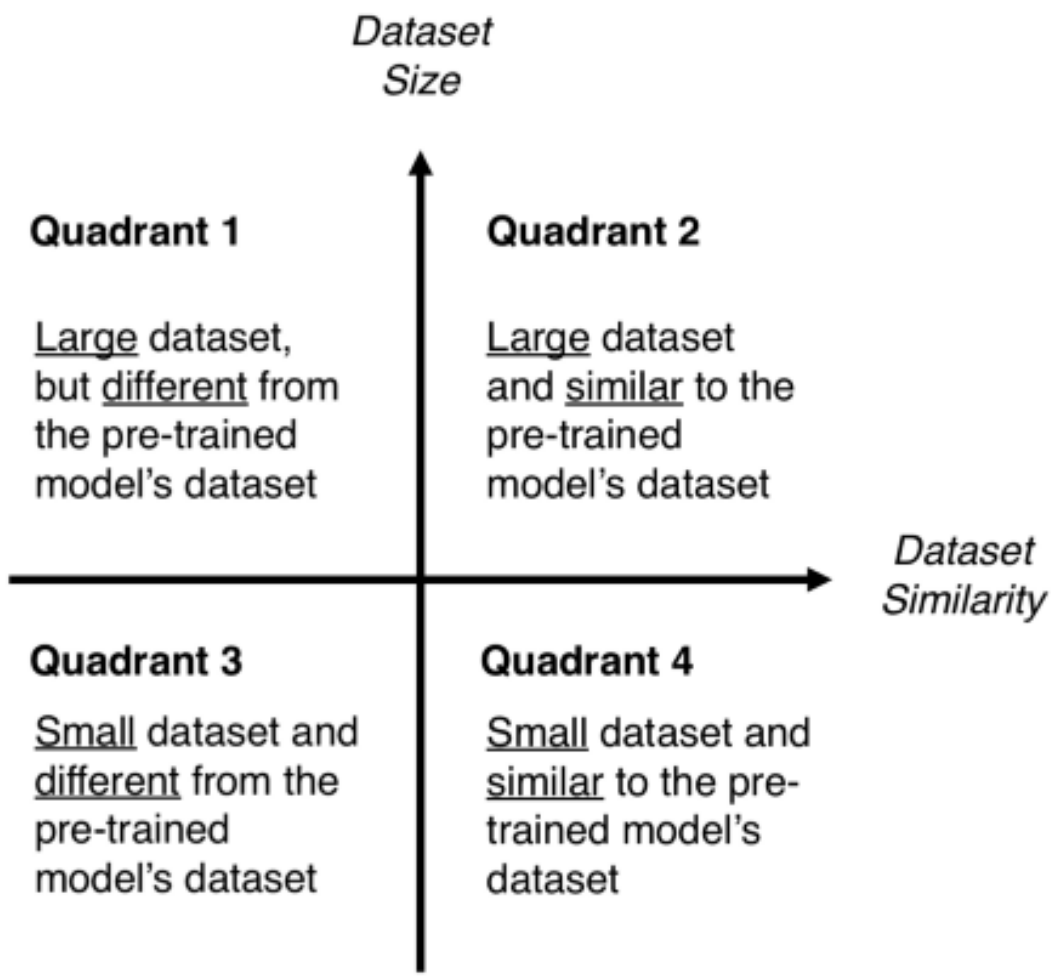
- Learning of a new tasks relies on the previous learned tasks:
  - Learning process can be faster, more accurate and/or need less training data

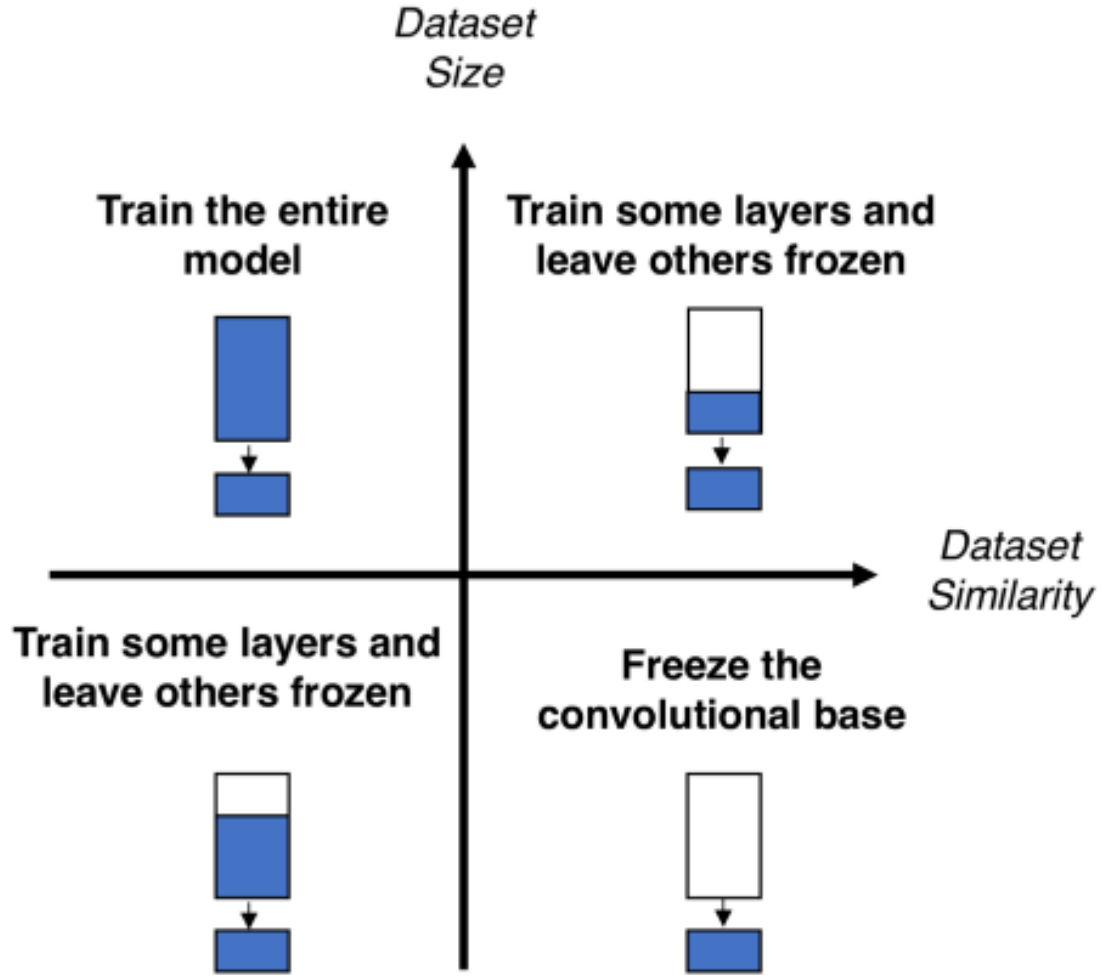


https://towardsdatascience.com/a-comprehensive-hands-on-guide-to-transfer-learning-with-real-world-applications-in-deep-learning-212bf3b2f27a



https://towardsdatascience.com/transfer-learning-from-pre-trained-models-f2393f124751





https://towardsdatascience.com/transfer-learning-from-pre-trained-models-f2393f124751

```
for layer in conv_base.layers[:number_of_layers]:
    layer.trainable = False

for layer in model.layers:
    print(layer.name, '     '[len(layer.name)-9:], layer.trainable);
```

```
input_1    False
stem_conv      False
stem_bn    False
...
block2a_activation  True
block2a_se_squeeze  True
block2a_se_reshape  True
```

Nienadzorowane uczenie wstępne

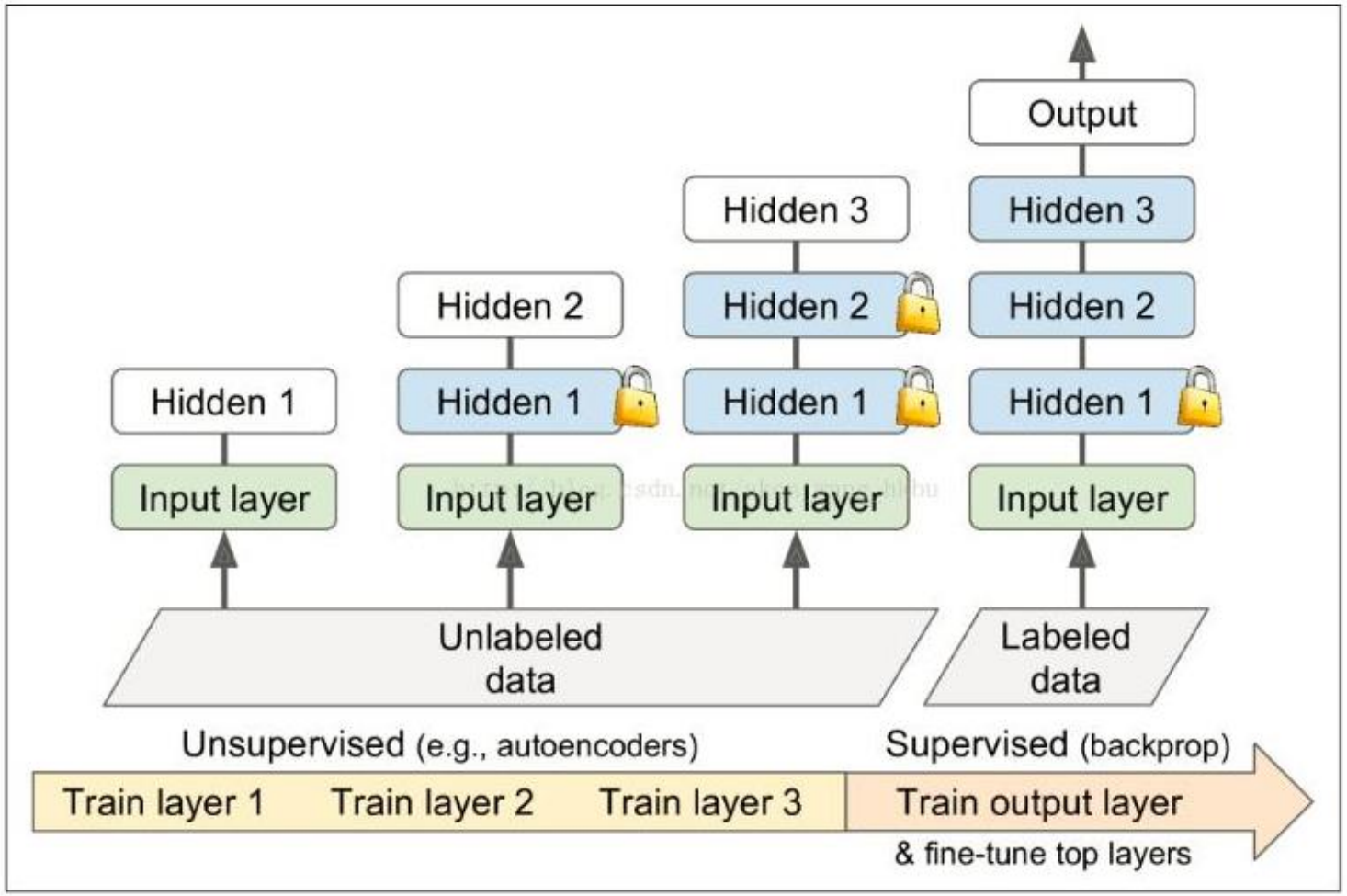
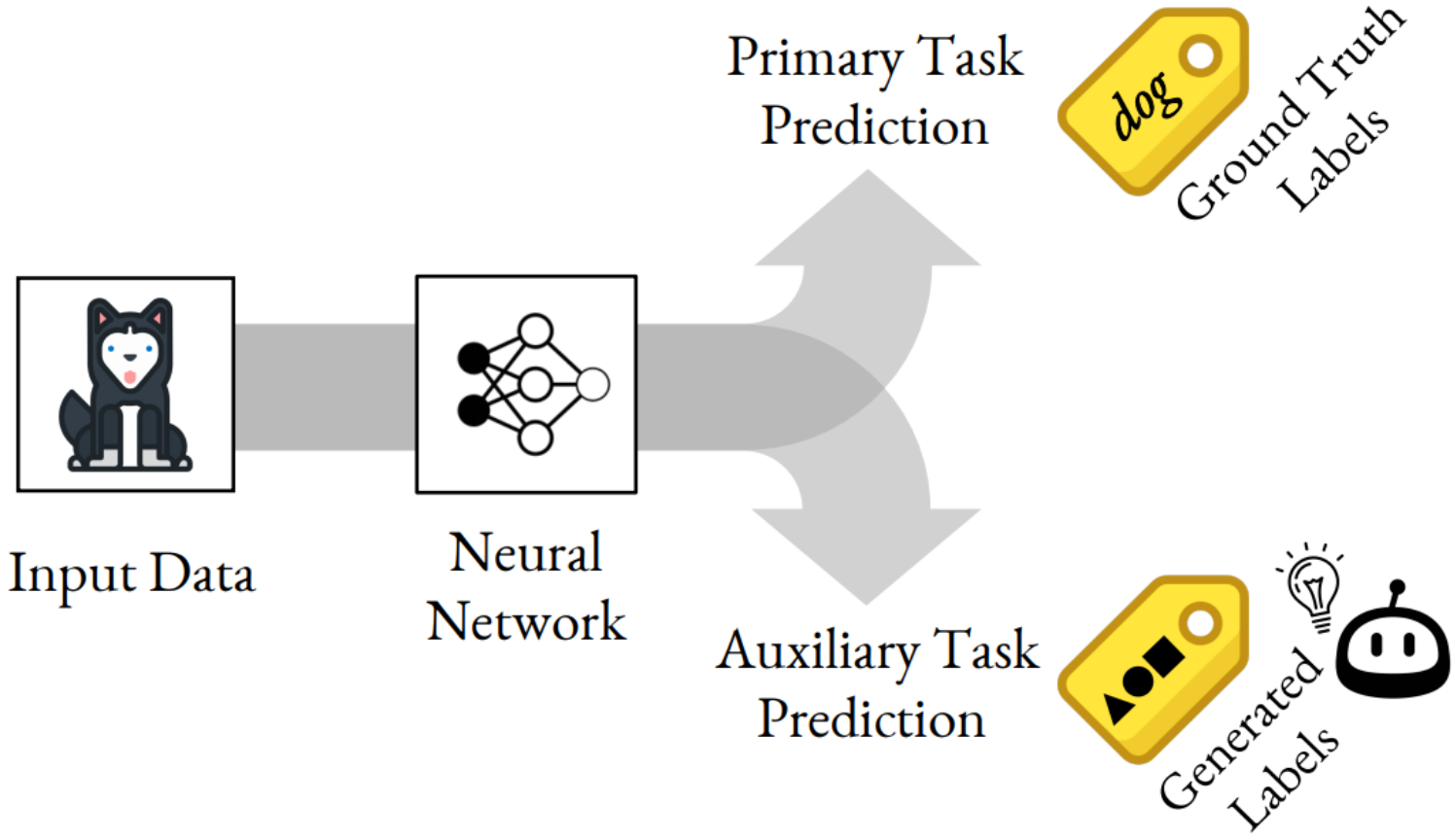


Figure 11-5. Unsupervised pretraining

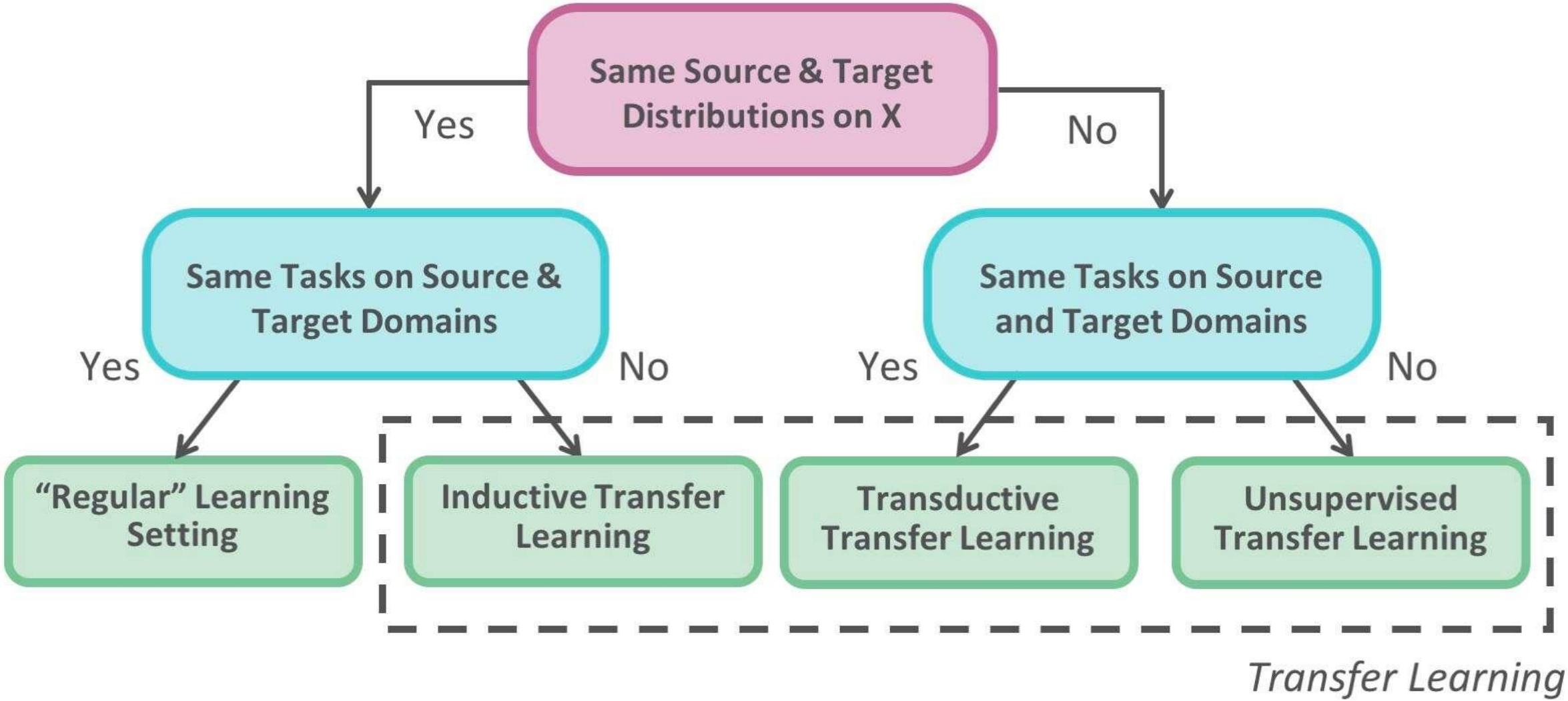
https://images1.programmersought.com/138/b9/b9858df7e366e129787de03b181f19ea.JPEG

Uczenie wstępne za pomocą dodatkowego zadania

- Mamy oznakowane dane uczące, albo można je łatwo pozyskać



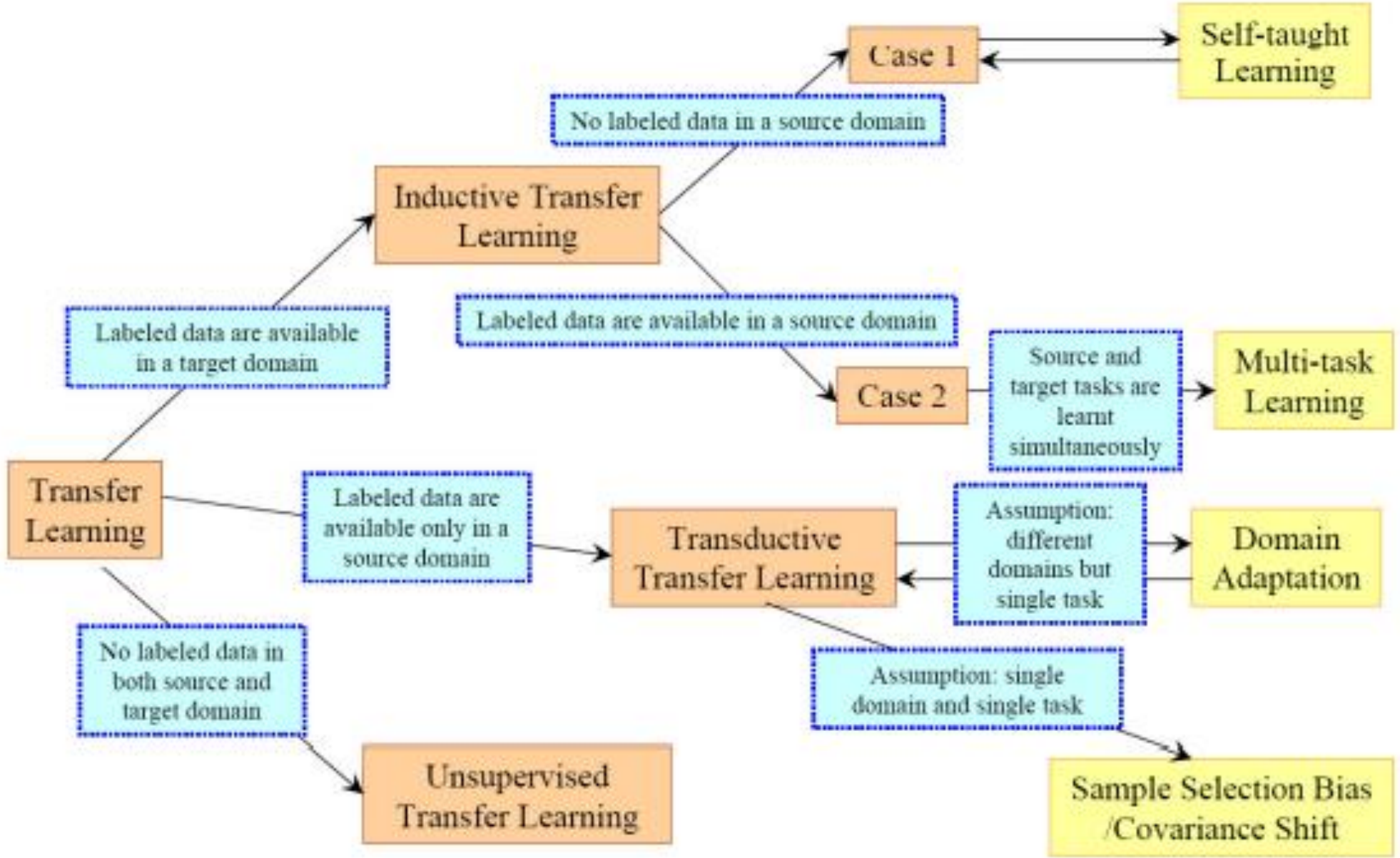
https://paperswithcode.com/media/thumbnails/task/task-0000001283-17b8a5b8_GZxJIhl.jpg



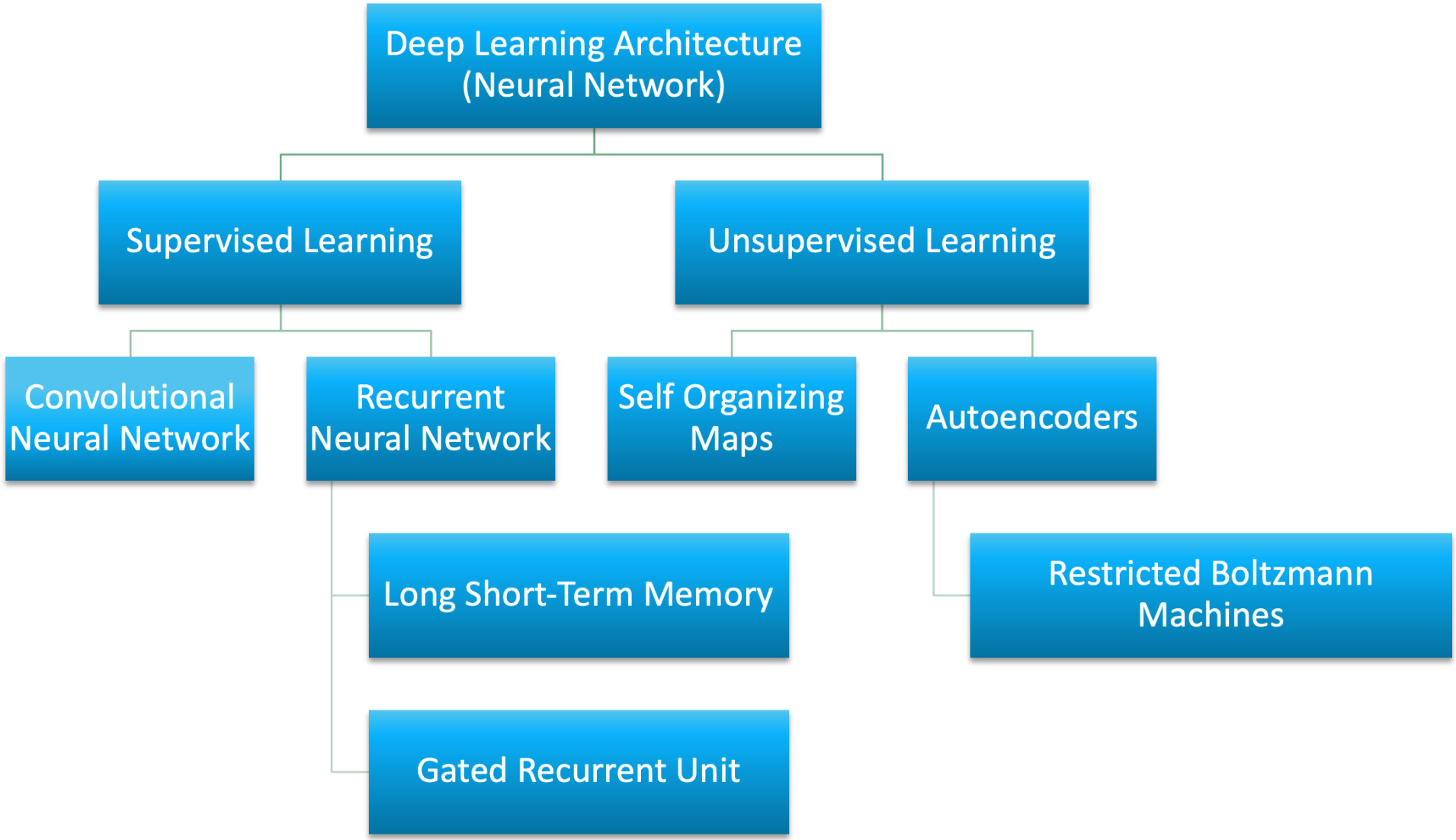
www.embedded.com/transfer-learning-for-the-iot/

Learning Strategy	Related Areas	Source & Target Domains	Source Domain Labels	Target Domain Labels	Source & Target Tasks	Tasks
Inductive Transfer Learning	Multi-task Learning	The Same	Available	Available	Different but Related	Regression Classification
	Self-taught Learning	The Same	Unavailable	Available	Different but Related	Regression Classification
Unsupervised Transfer Learning		Different but Related	Unavailable	Unavailable	Different but Related	Clustering Dimensionality Reduction
Transductive Transfer Learning	Domain Adaptation, Sample Selection Bias & Co-variate Shift	Different but Related	Available	Unavailable	The Same	Regression Classification

towardsdatascience.com/a-comprehensive-hands-on-guide-to-transfer-learning-with-real-world-applications-in-deep-learning-212bf3b2f27a

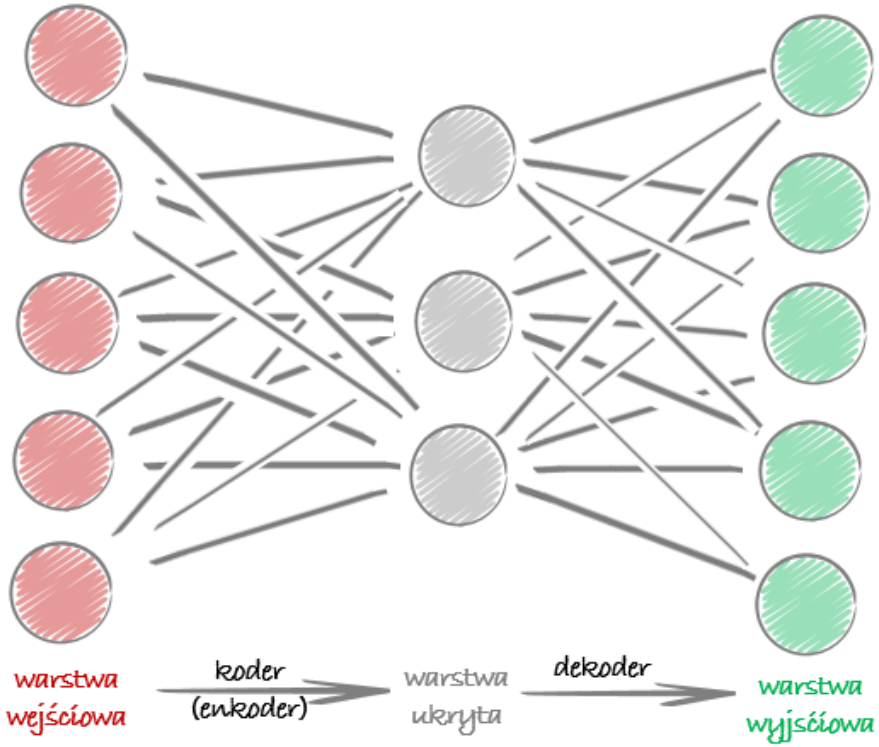


Autoenkodery

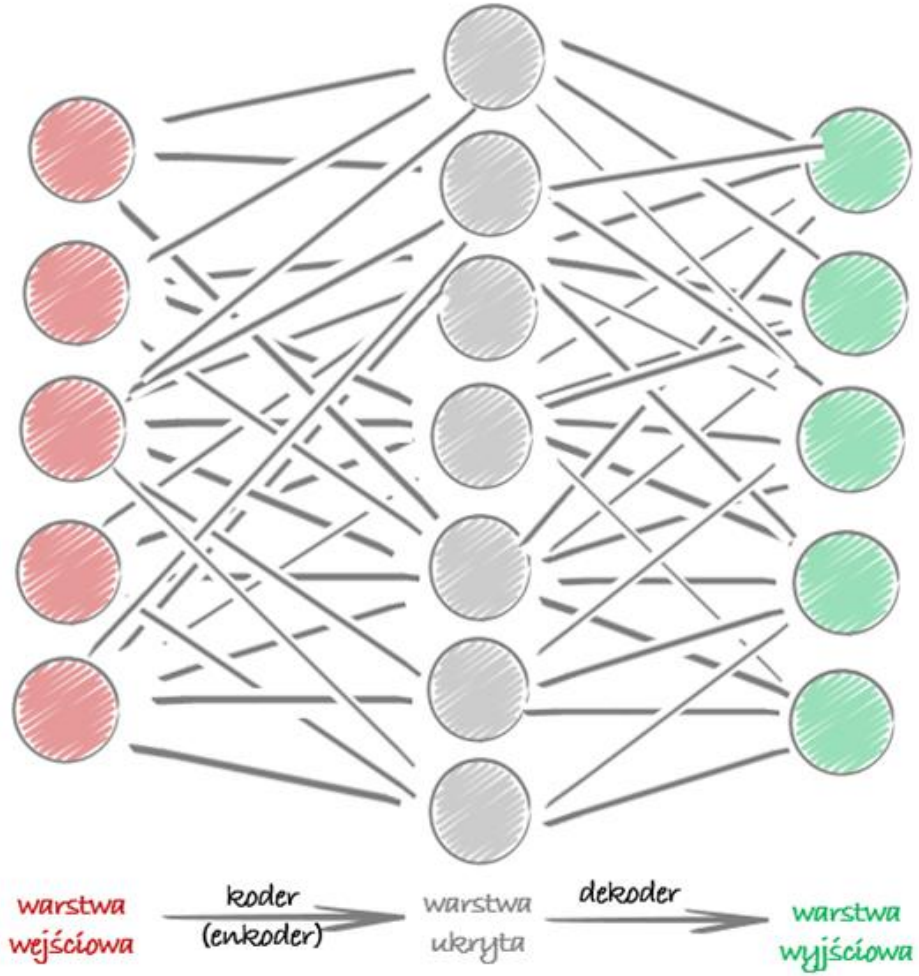


https://developer.ibm.com/technologies/artificial-intelligence/articles/cc-machine-learning-deep-learning-architectures/

Autoenkodery



niedopełniony
(undercomplete)



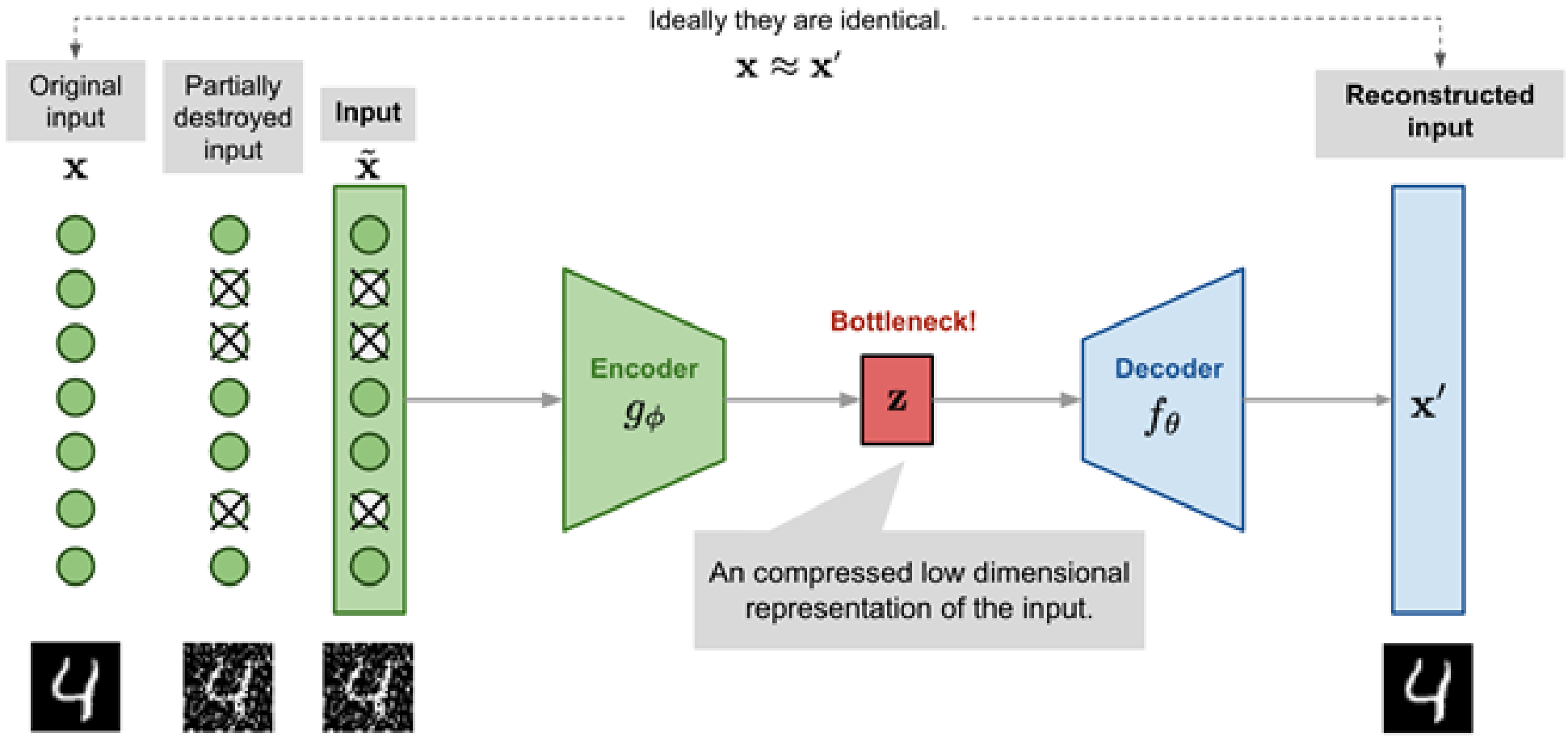
przepełniony
(overcompleted)

https://miroslawmamczur.pl/czym-sa-autoenkodery-autokodery-i-jakie-maja-zastosowanie

Zastosowania autoenkoderów

- Redukowanie wymiarowości
- Rekonstrukcja danej klasy obiektów - klasyfikacja
- Wykrywanie anomalii
- Generowanie nowych cech
- Generowanie nowych danych przypominających zbiory danych uczących
- Systemy rekomendacyjne

Autoenkodery odszumiające (ang. denoising autoencoders)



https://lilianweng.github.io/lil-log/2018/08/12/from-autoencoder-to-beta-vae