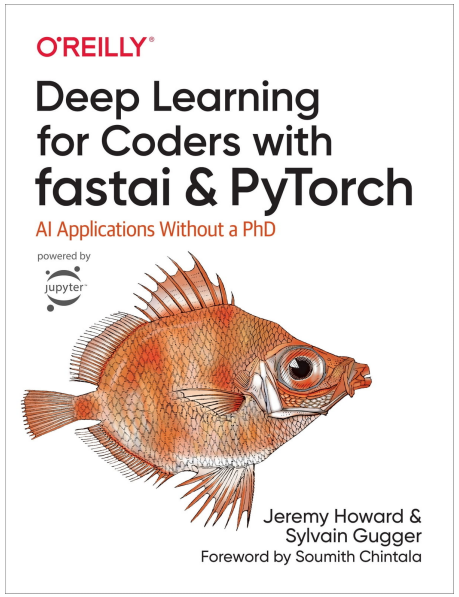
An Introduction to Deep Learning with fast.ai

By: Ahad Jawaid



Sources

- Figure and content are from “Deep Learning for Coders with fastai & PyTorch” by Jeremy Howard and Sylvain Gugger
- https://course.fast.ai/

Goals

- Understand what deep learning is
- Understand a neural network
- Understand transfer learning
- Fine tune a deep learning model
- Deploy a deep learning model

Agenda

- What is Machine Learning
- How to train machine learning model
- Transfer Learning
- What is Fast.ai
- Workshop time!!

Machine Learning is for everyone

Myth (don't need)	Truth
Lots of math	High school math is sufficient.
Lots of data	We've seen record-breaking results with <50 items of data.
Lots of expensive computers	You can get what you need for state-of-the-art work for free.

Neuron vs Artificial Neuron

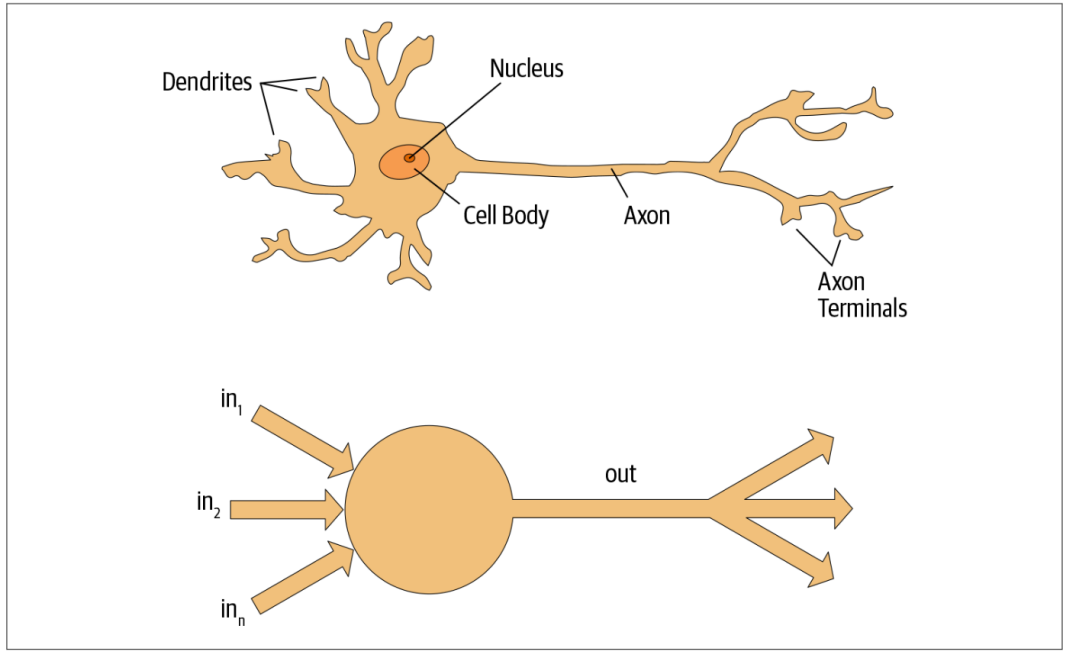
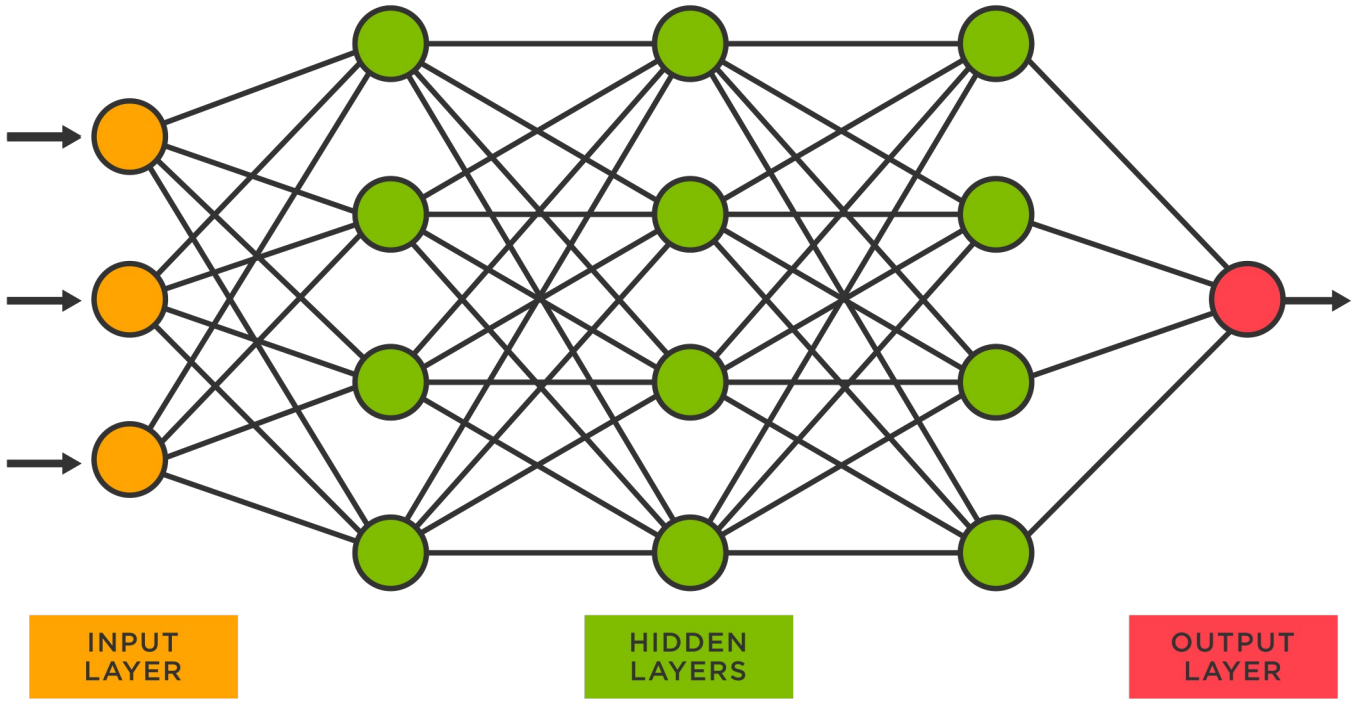


Figure 1-1. Natural and artificial neurons

Neural Network



Program vs Machine Learning

Figure 1-4. A traditional program

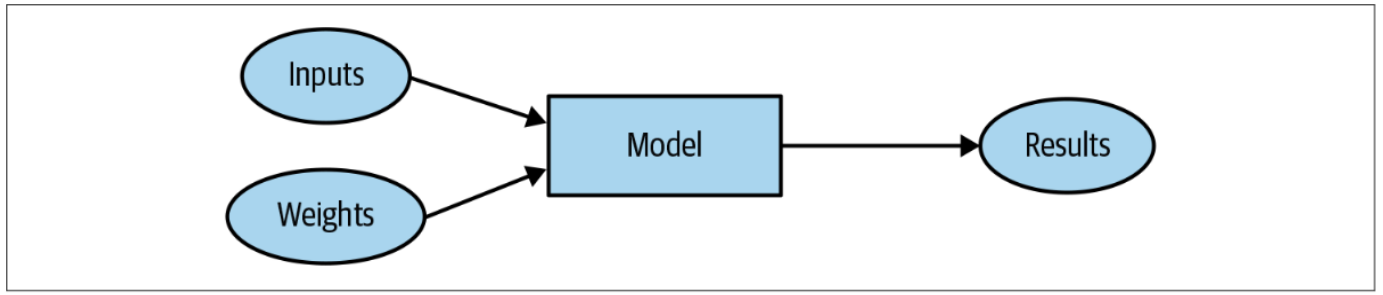


Figure 1-5. A program using weight assignment

Training a Machine Learning Model

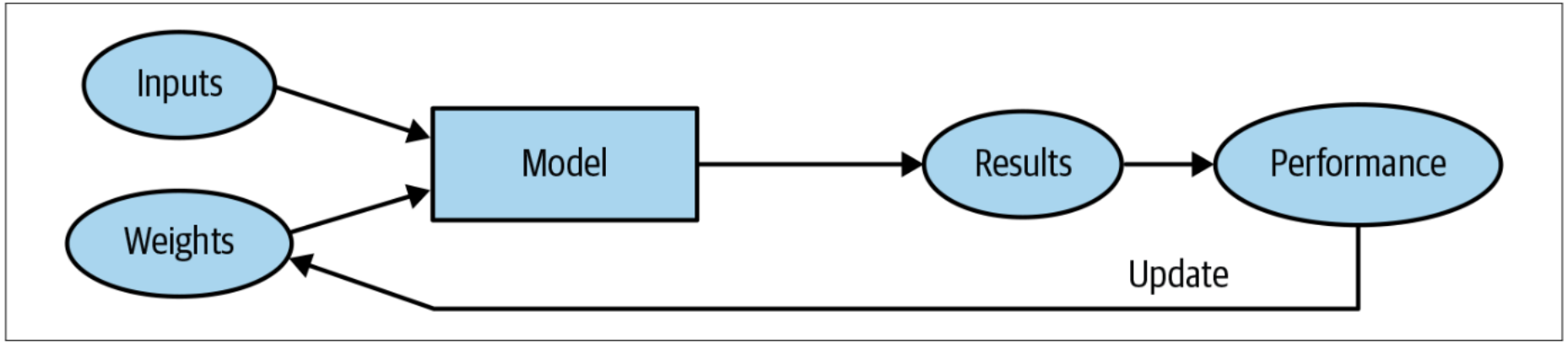


Figure 1-6. Training a machine learning model

Training a Machine Learning Model

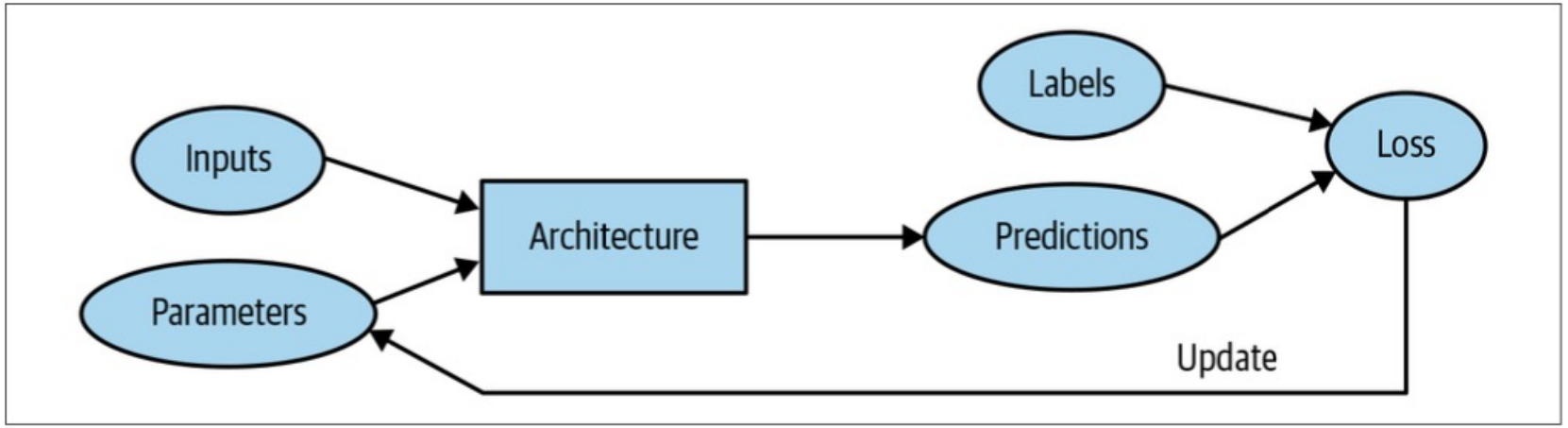
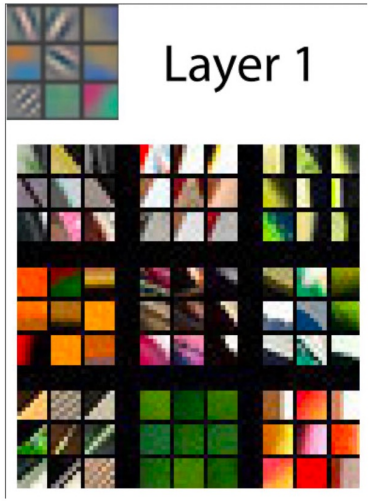


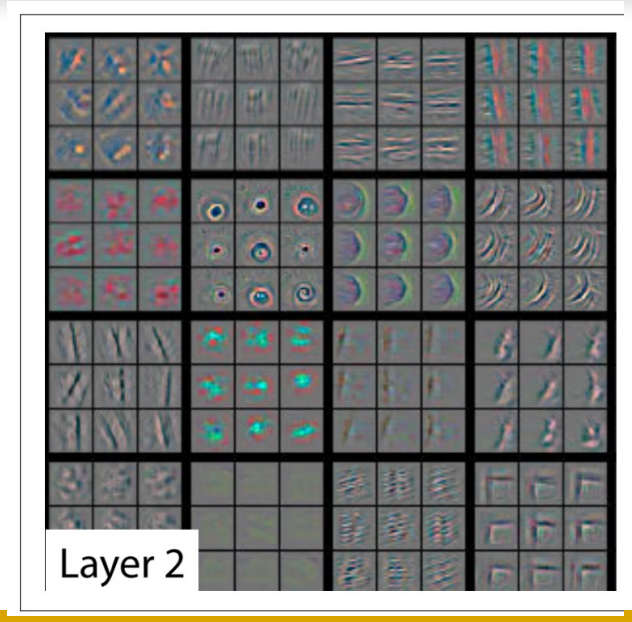
Figure 1-8. Detailed training loop

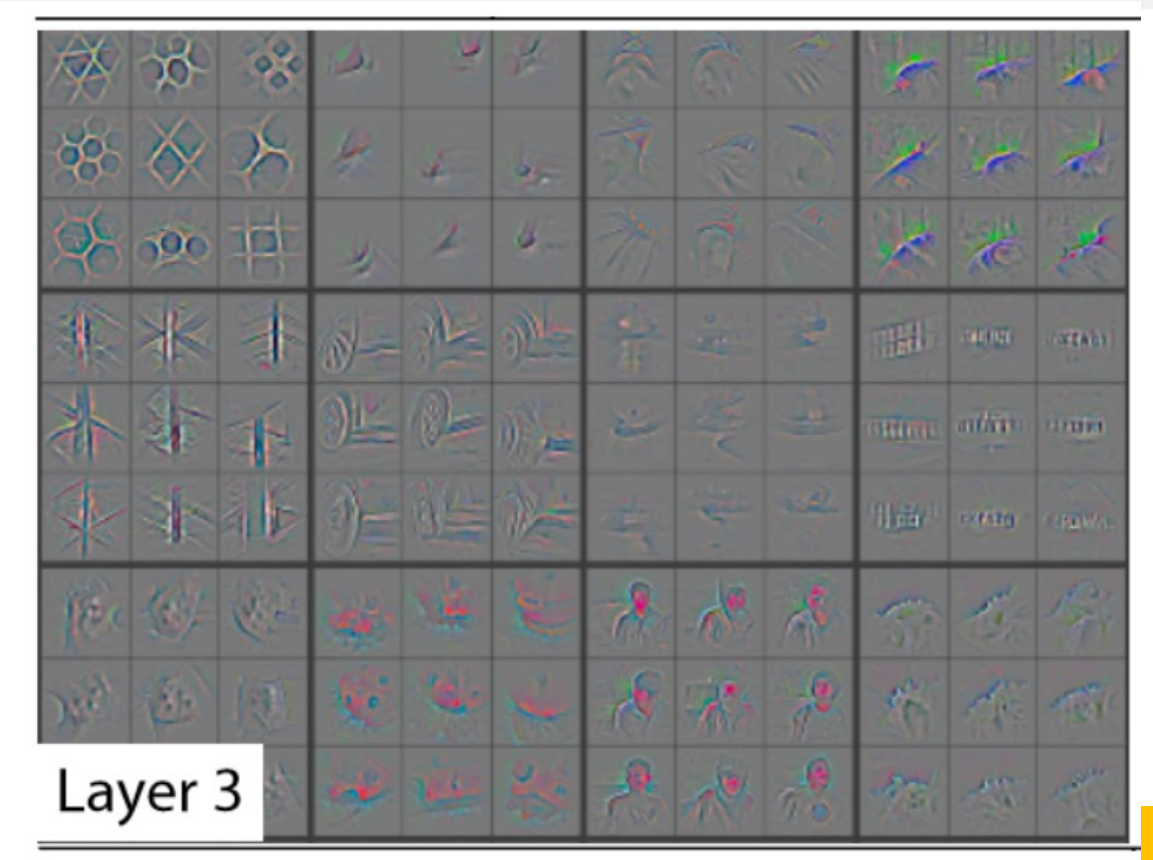
Jargon

- Architecture = functional form of the model
- Parameters = weights
- Prediction = output of model
- Label = Correct output
- Performance = Loss of the model

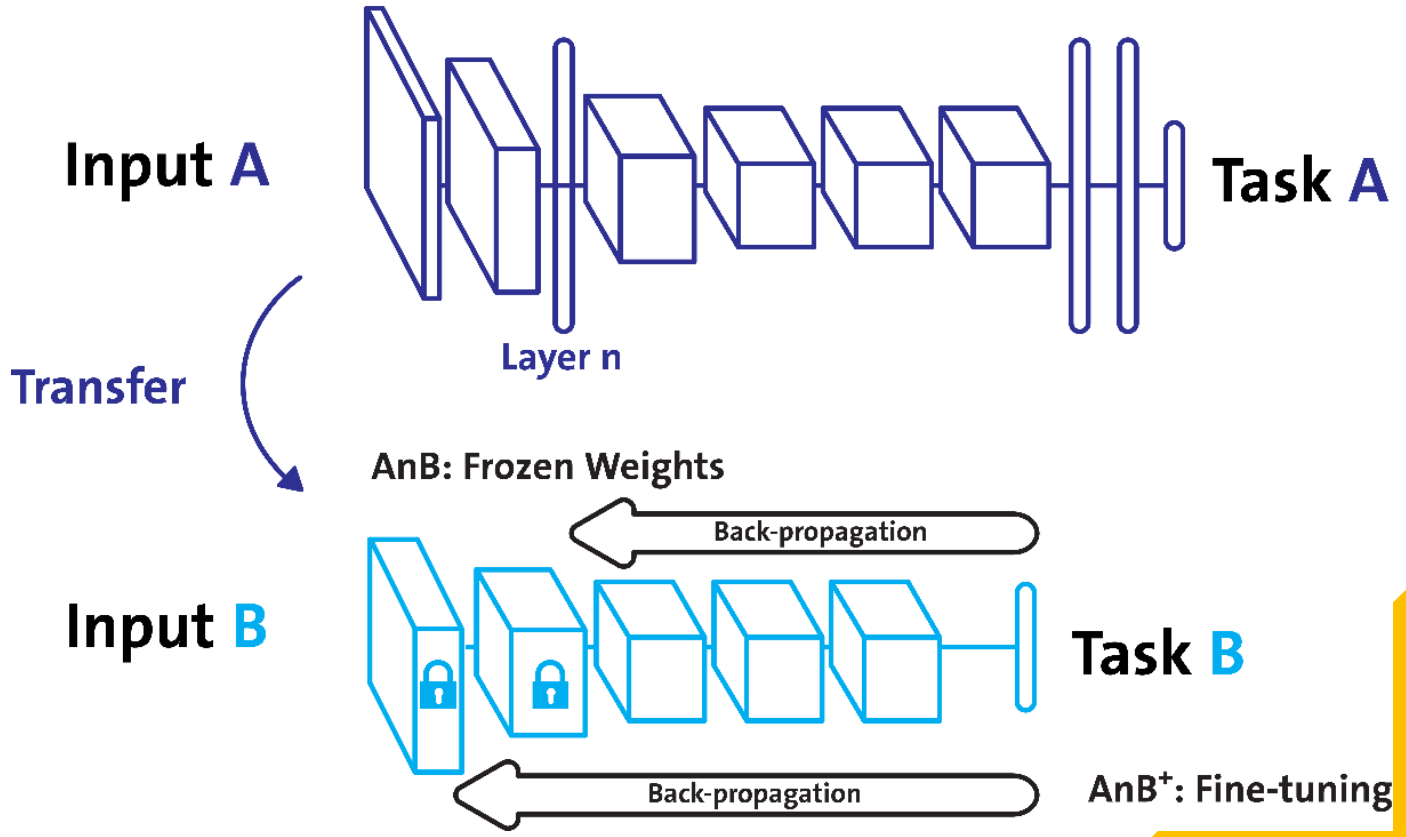
Visualizing Neural Network







Transfer Learning



What is fast.ai

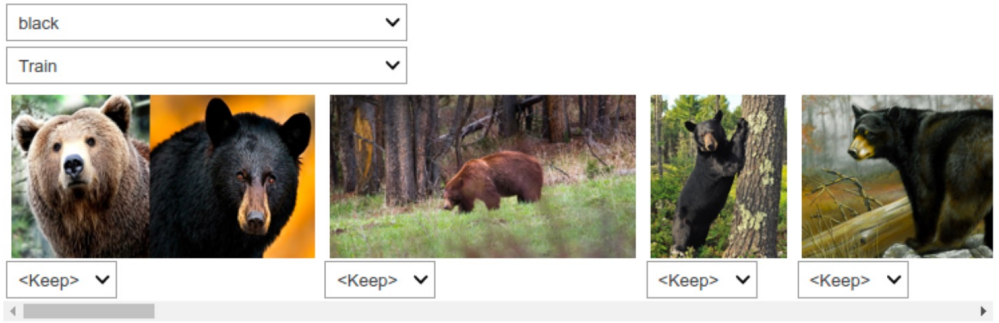
Why use fast.ai

```
from fastai.vision.all import *

path = untar_data(URLs.PETS)/'images'

def is_cat(x): return x[0].isupper()

dls = ImageDataLoaders.from_name_func(
      path, get_image_files(path), valid_pct=0.2, seed=42,
      label_func=is_cat, item_tfms=Resize(224)
)

learn = cnn_learner(dls, resnet18, metrics=error_rate)
learn.fine_tune(1)
```

epoch	train_loss	valid_loss	error_rate	time
0	0.169049	0.057087	0.018945	00:51

epoch	train_loss	valid_loss	error_rate	time
0	0.043253	0.021235	0.008796	01:06

```
cleaner = ImageClassifierCleaner(learn)
cleaner
```



Workshop time!!

- https://github.com/ahadjawaid/fastai-workshop