# Deep Learning with PyTorch

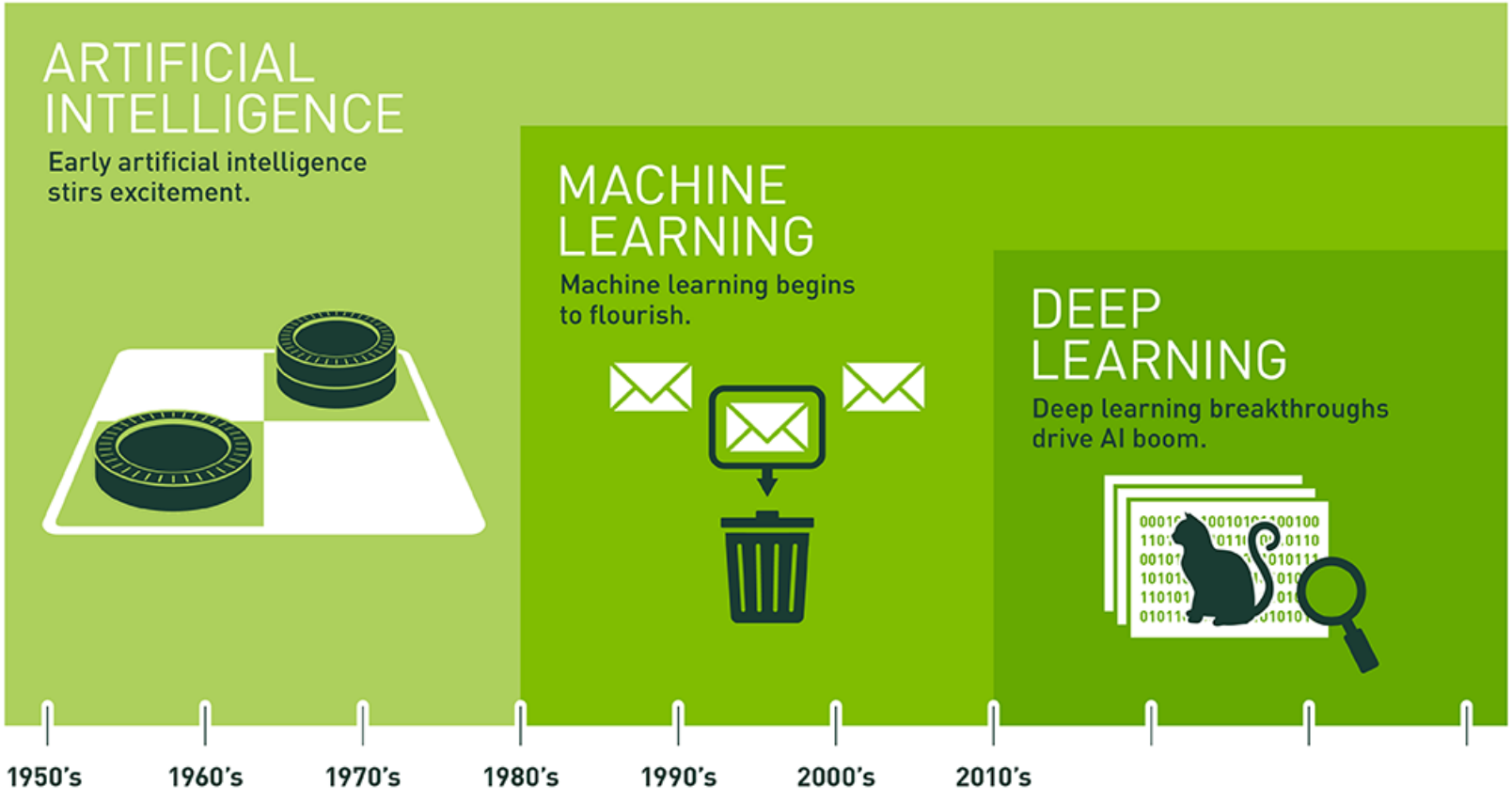
A short tour @lpyug 2017-02-14 19:00.

Martin Czygan | github.com/miku/pytorch-tour

## What is Deep Learning?

> Deep learning is a branch of machine learning based on a set of algorithms that attempt to model high-level abstractions in data by using multiple processing layers, with complex structures or otherwise, composed of multiple non-linear transformations.

# AI, ML, DL, ...




Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

# What is Deep Learning?

- some definition: anything with more than two hidden layers
- computationally expensive, high capacity learning machines

# In the news and elsewhere

- AlphaGo (March 2016, Deep Learning and the Game of Go)
- ImageNet classification (2014, VGG16, VGG19)
- Real-Time object detection (2013, darknet)
- Image Captioning
- Neural Style Transfer
- WaveNet (speech generation)
- Speech recognition (2017, DeepSpeech)
- Translation (2016, OpenNMT)
- Word Embeddings (2013, word2vec; 2016, fasttext)

## And much more

- Image and scene generation
- Image segmentation
- Lip reading
- Text generation
- Time series forecast

## History: "A tiny bit of money"

In Nov 2007, Geoffrey Hinton gave a tech talk at Google, called *The Next Generation of Neural Networks*. He seems like a slightly desperate.

> We only trained this network once one one data set. If we could get a tiny bit of money from someone we could make this whole thing work much better.

Ten years later Hinton introduces the Vector Institute at University of Toronto.

## Why Now?

- In short: data, cuda, relu.
- Or: availability of data, GPUS, algorithmic advances.

# Deep Learning Frameworks

- Abstract away the neural network construction and learning algorithms
- Lots of Python wrappers or pure Python APIs
- tensorflow, keras, mxnet, pytorch, paddle, CNTK, dlib, Theano, chainer, dynet, ...
- Other languages: caffe, caffe2, DL4J, DIGITS

# Deep Learning Frameworks

-

## Parts and Ingredients

Build a computational graph, utilize automatic differentiation, to adjust the parameters of your model according to a given loss function, that captures the distance between the computed and the expected output, given enough training data.

# PyTorch

It’s a Python based scientific computing package targeted at two sets of audiences:

- A replacement for NumPy to use the power of GPUs
- a deep learning research platform that provides maximum flexibility and speed