

ML/DL for Everyone with PYTORCH

Lecture 1: Overview



Sung Kim <hunkim+ml@gmail.com> HKUST

Code: <https://github.com/hunkim/PyTorchZeroToAll>

Slides: <http://bit.ly/PyTorchZeroAll>

Videos: <http://bit.ly/PyTorchVideo>



Call for Comments

Please feel free to add comments directly on these slides.

Other slides: <http://bit.ly/PyTorchZeroAll>





for your comments!

- Kyung Mo Kweon
- JooSung Yoon
- jungho choi
- 나로
- Junmo An
- Hwanhee Kim
- Stephen Lai
- SEN GmbH
- Karthick P
- Kabjin Kwon
- Zhou He
- ...
- ...

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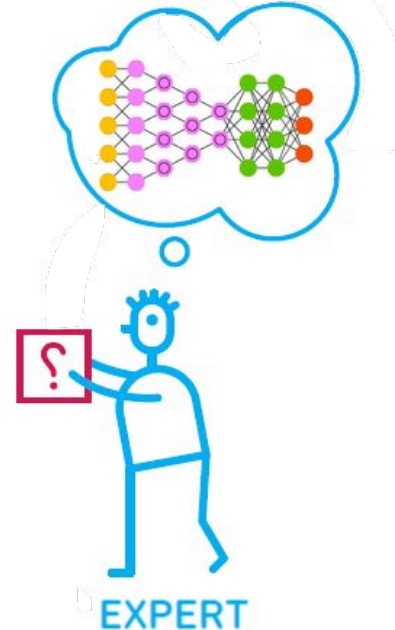
Slides: <http://bit.ly/PyTorchZeroAll>

Videos: <http://bit.ly/PyTorchVideo>

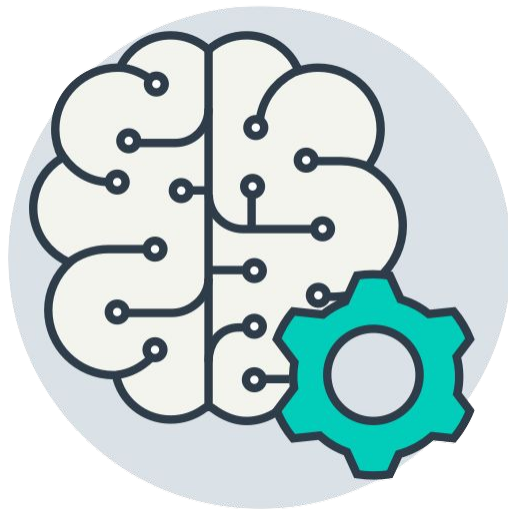


Goals

- Basic understanding of machine learning/deep learning
- PyTorch implementation skills
- Zero to All!
 - Basic algebra + probability
 - Basic python



What is ML?



What is Human Intelligence?

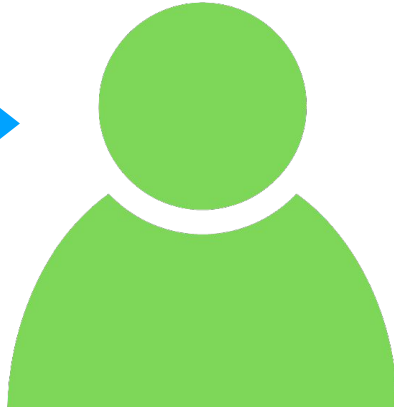
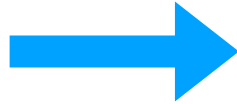


What is Human Intelligence?
What to eat for lunch?



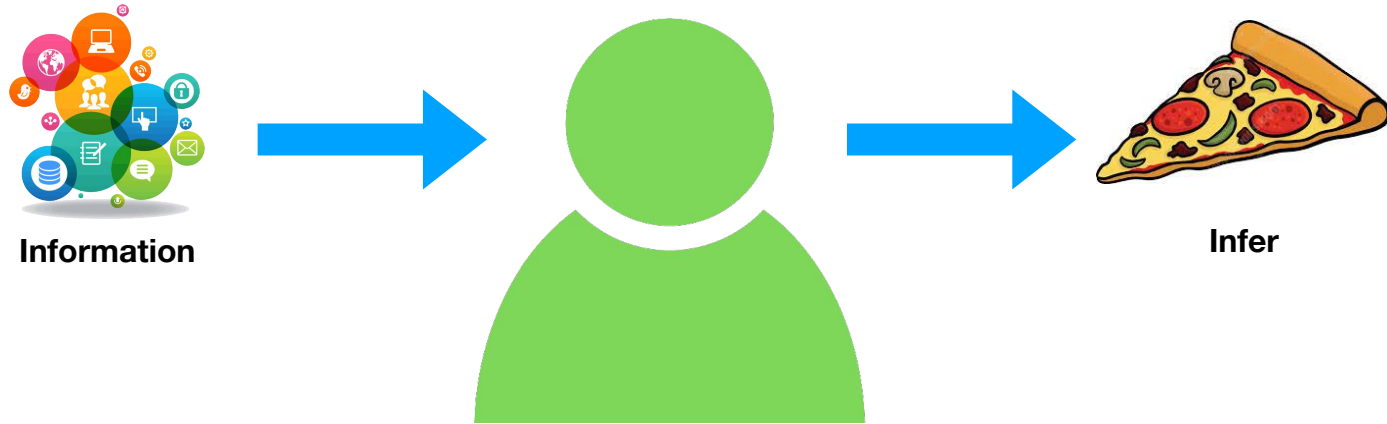
What is Human Intelligence?

What to eat for lunch?



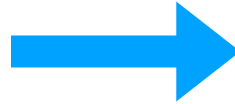
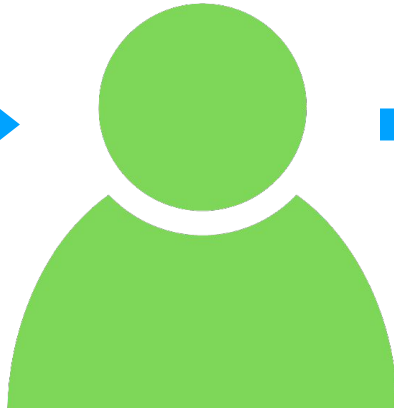
What is Human Intelligence?

What to eat for lunch?



What is Human Intelligence?

What to dress?



Infer

What is Human Intelligence?

What is this picture?



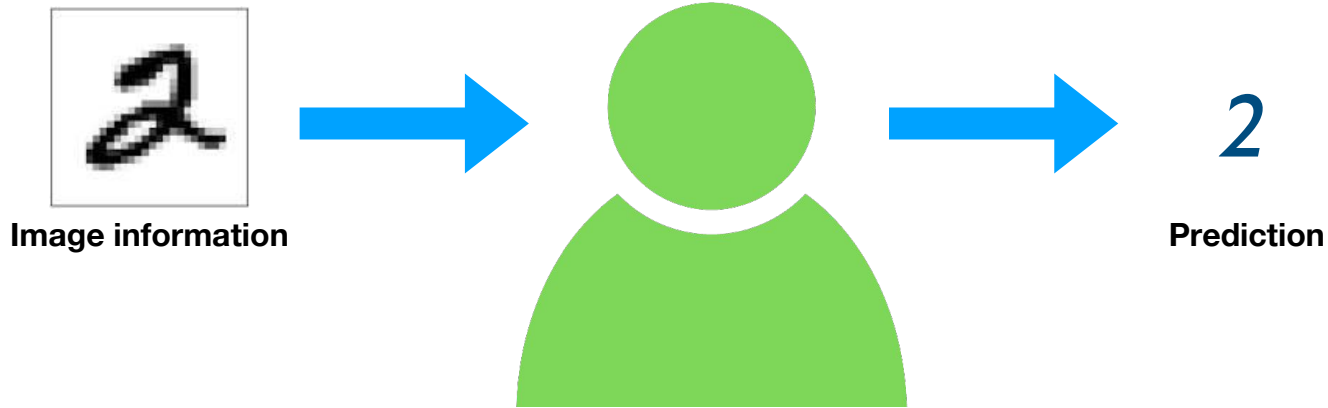
Image information



Prediction

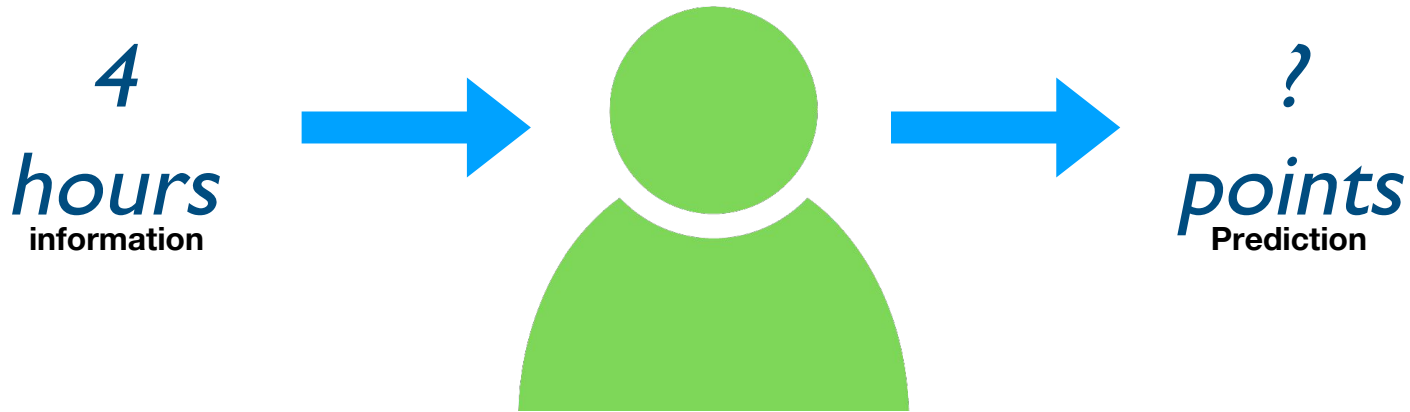
What is Human Intelligence?

What is this number?



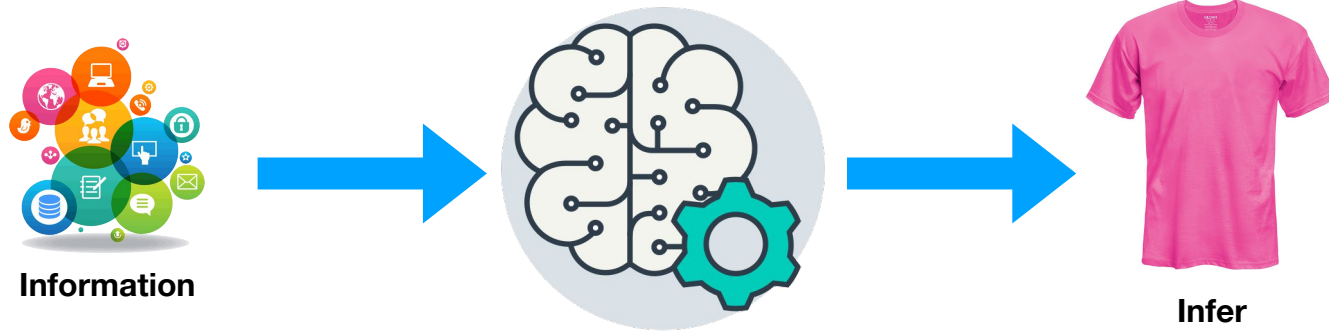
What is Human Intelligence?

What would be the grade if I study 4 hours?



Machine Learning

What to dress?

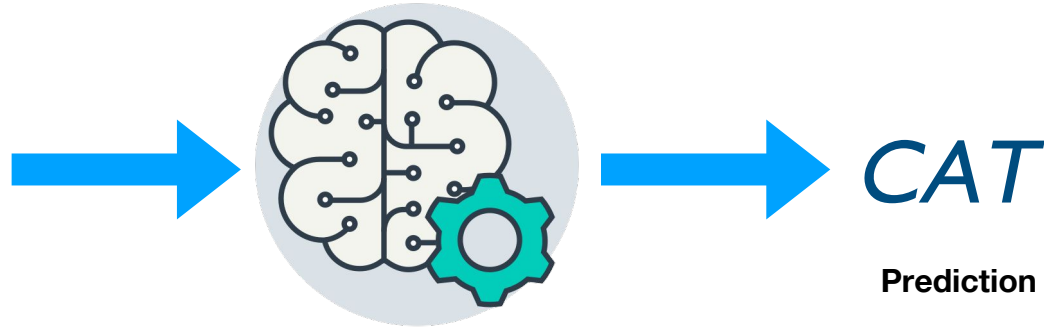


Machine Learning

What is this picture?



Image information

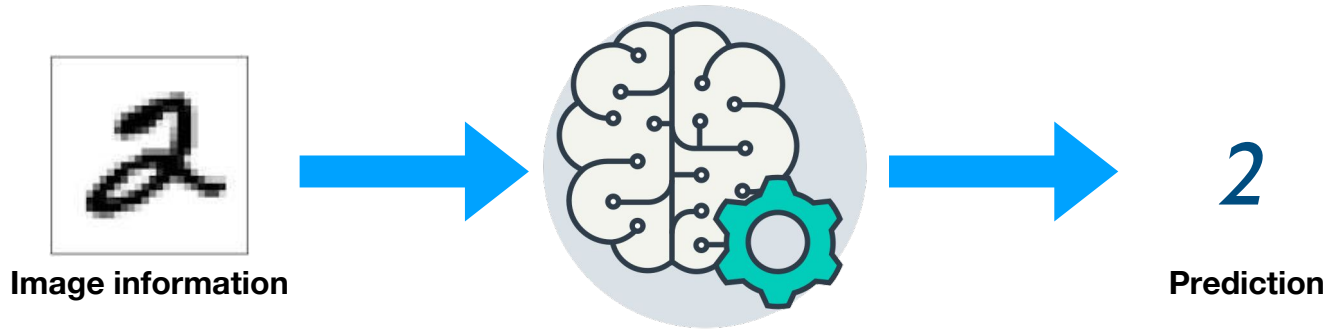


CAT

Prediction

Machine Learning

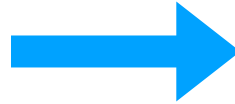
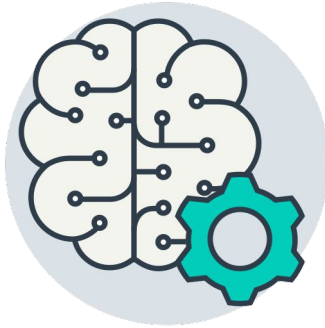
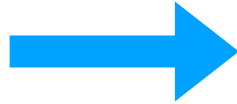
What is this number?



Machine Learning

What would be the grade if I study 4 hours?

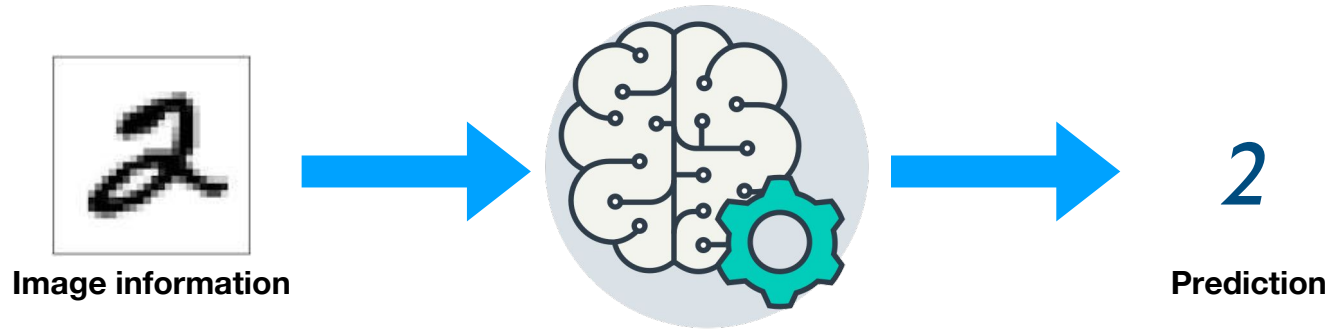
4
hours
information



?
points
Prediction

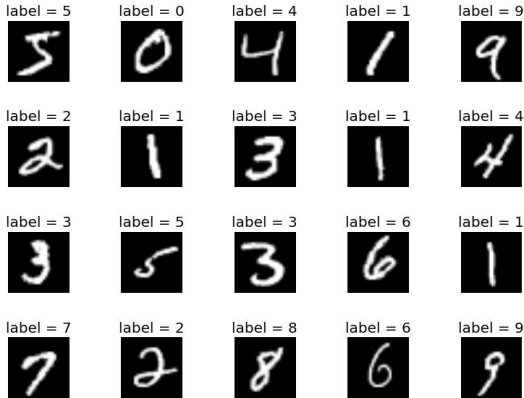
Machine Learning

Machine needs lots of training



Machine Learning

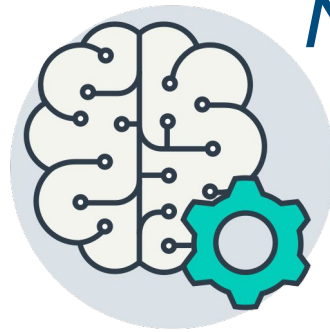
Machine needs lots of training



*Labeled
dataset*



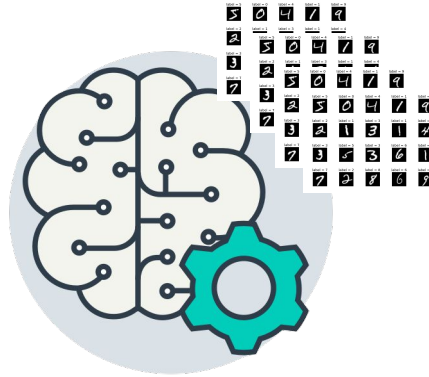
training



Model

Machine Learning

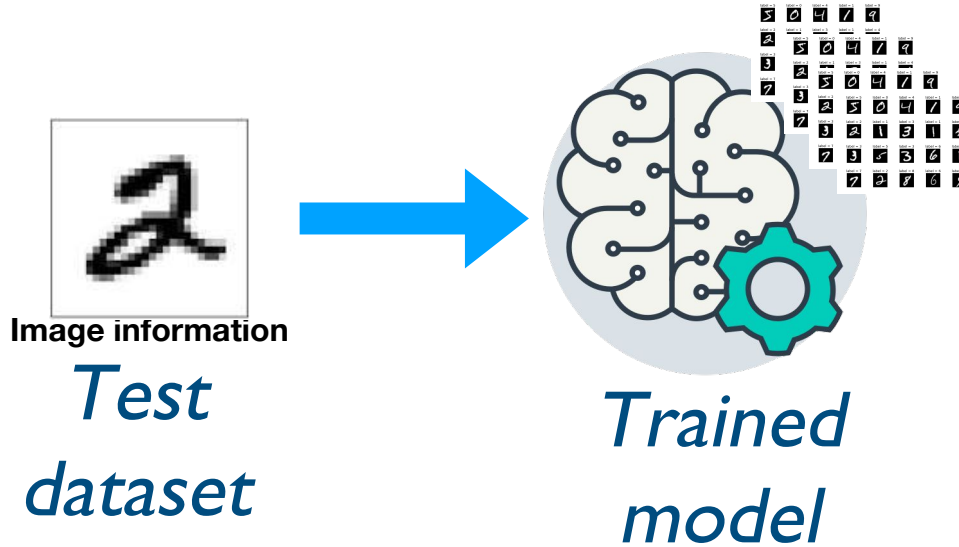
Predict (test) with trained model



*Trained
model*

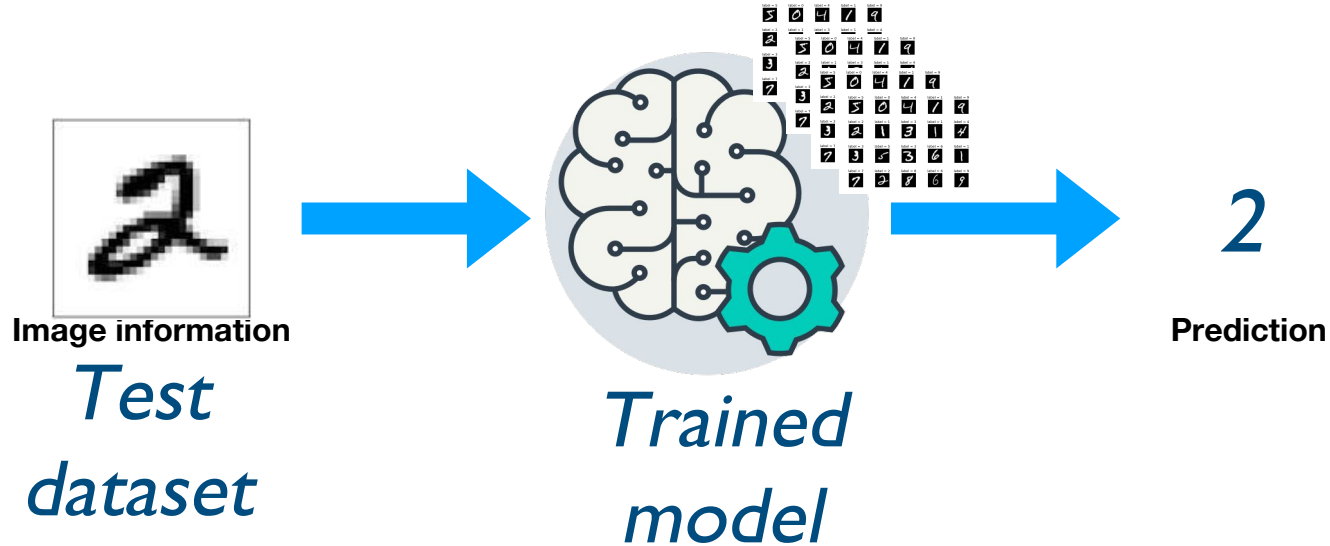
Machine Learning

Predict (test) with trained model



Machine Learning

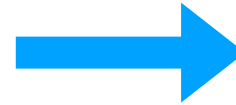
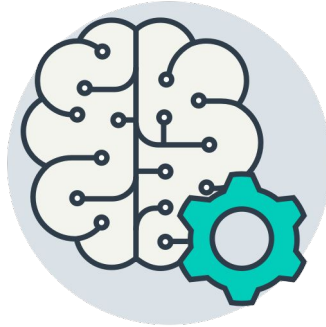
Predict (test) with trained model



Machine Learning

What would be the grade if I study 4 hours?

*4
hours*



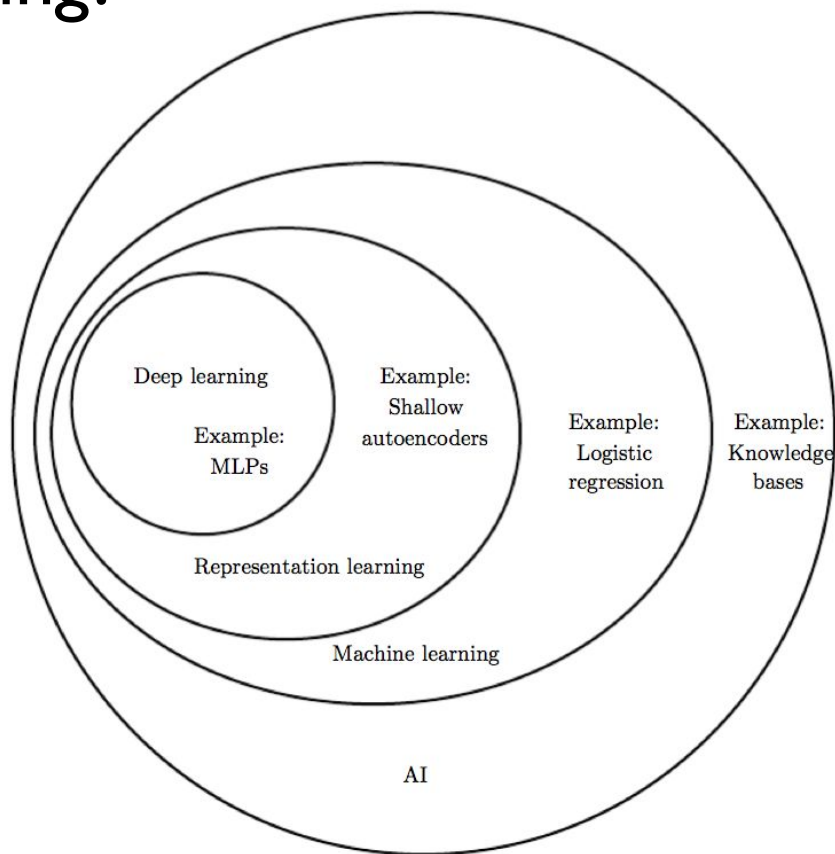
*?
points*
Prediction

Hours (x)	Points (y)
1	2
2	4
3	6
4	?

Training dataset

Test dataset

Deep Learning?



Why We Care?



Q: What color is court? A: Blue

Visual Question Answering

Answering Questions Based On Images



Generating New Words

Word Generator Using RNNs



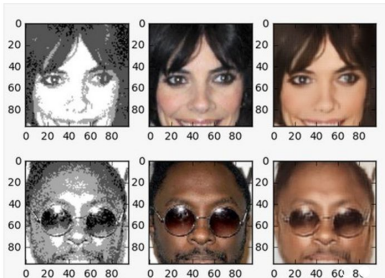
Artistic Style Transfer

Applying The Style Of An Artwork To A Photo



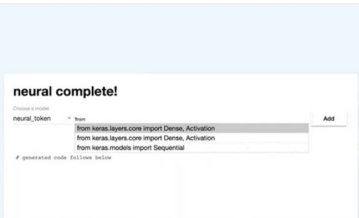
Predicting Cardiac Abnormalities

Using Phonocardiogram (PCG) Data



Creating Photorealistic Images

Improving Images From A Gameboy Camera

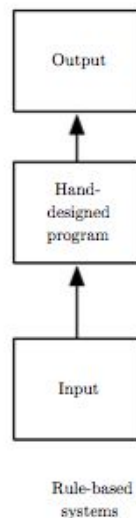


Code Autocompletion

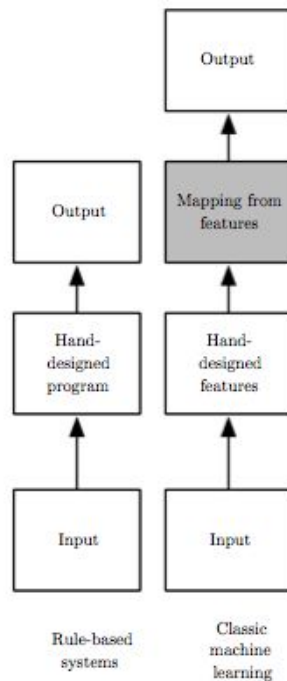
NN That Autocompletes NN Code

More demos at <https://ml-showcase.com/>

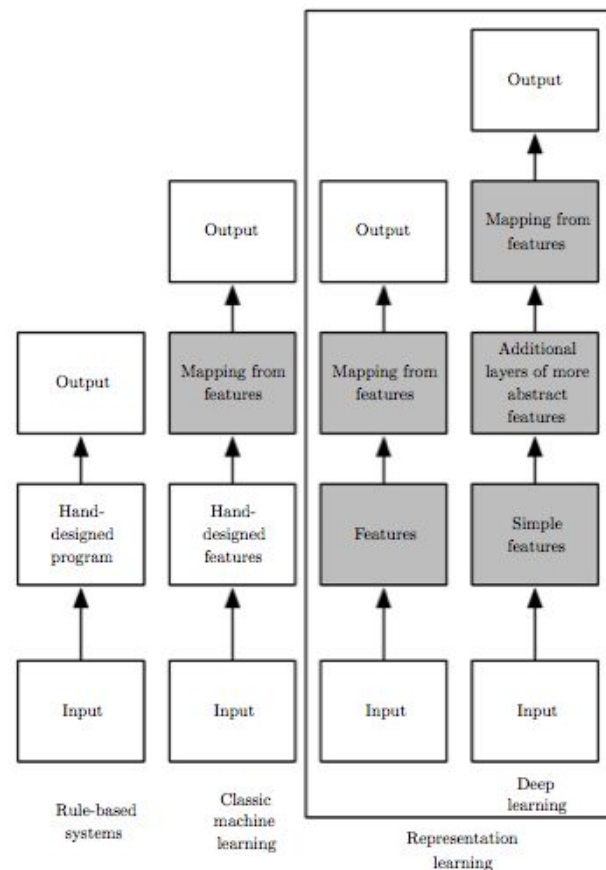
Why We Care as Developer?



Why We Care as Developer?

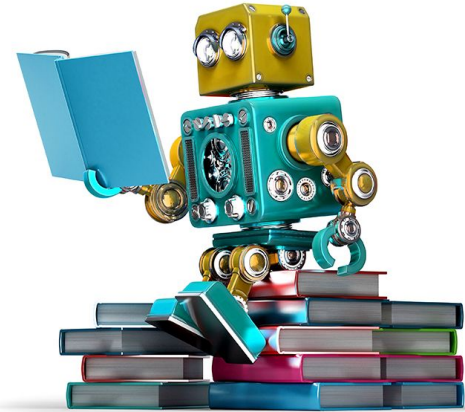
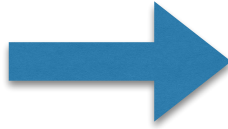
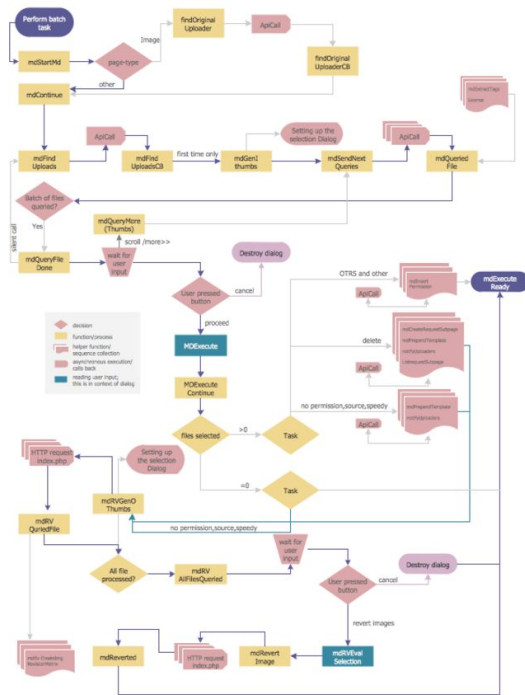


Why We Care as Developer?



Deep Learning by [Ian Goodfellow](#), [Yoshua Bengio](#), [Aaron Courville](#)

Rule based VS representation learning



Good News

- Deep Learning is not too difficult (yet)
 - Basic algebra + probability + python
 - Less than one year study
- Many frameworks
- Unlimited study resources
- And most of all, it's really fun





PyTorch is a python package that provides two high-level features:

- Tensor computation (like numpy) with strong GPU acceleration
- Deep Neural Networks built on a tape-based autograd system

Why PYTORCH

- More Pythonic (imperative)
 - Flexible
 - Intuitive and cleaner code
 - Easy to debug
- More Neural Networkic
 - Write code as the network works
 - forward/backward

Install PYTORCH



Get Started.

Select your preferences, then run the PyTorch install command.

Please ensure that you are on the latest pip and numpy packages.
Anaconda is our recommended package manager

OS	Linux	OSX	
Package Manager	conda	pip	Source
Python	2.7	3.5	3.6
CUDA	7.5	8.0	None

Run this command:

```
pip3 install http://download.pytorch.org/whl/torch-0.2.0.post3-cp36-cp36m-macosx_10_7_x86_64.whl
pip3 install torchvision
# OSX Binaries dont support CUDA, install from source if CUDA is needed
```

Exercise I-I:

Install PyTorch on your computer!

```
09:40 $ python3
```

```
Python 3.6.2 (v3.6.2:5fd33b5926, Jul 16 2017, 20:11:06
```

```
[GCC 4.2.1 (Apple Inc. build 5666) (dot 3)] on darwin
```

```
Type "help", "copyright", "credits" or "license" for more information.
```

```
>>> import torch
```

```
>>> print(torch.__version__)
```

```
0.2.0_3
```

```
>>> # Happy!!
```

Topics

- Linear, Logistic, softmax models
 - DNN: Deep Neural Net
 - CNN: Convolutional Neural Net
 - RNN: Recurrent Neural Net
-
- Write everything in PyTorch



Lecture 2: Linear Model