2018 Asia University AI Summer Program (Day4-July6) A: Midterm Review

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Content

- The 3rd Wave of AI
- Midterm Review
  - AIY
  - Machine Learning
  - Deep Learning
- Next Deep learning Lessons by Prof. Charles Wang
  - CNN (Convolutional Neural Network),
  - RNN (Recurrent Neural Network)
  - GAN(Generative Adversarial Network)
- Final project development

The 3rd Wave of AI Since

- DeepMind AlphaGo

- In March 2016, AlphaGo beat Lee Sedol , a 9-dan professional player.

Review 1: Google AIY

- Software extensions
- Hardware extensions
- Android Things Assistant

Software extensions of AIY

- Source code
- Python API Reference
- Create a new activation trigger
- Use the Google Assistant library with a button

Android Things Assistant

Android Things makes developing connected embedded devices easy by providing the same Android development tools, best-in-class Android framework, and Google APIs that make developers successful on mobile. Android Things extends the core Android framework with additional APIs provided by the Things Support Library. These APIs allow apps to integrate with new types of hardware not found on mobile devices.
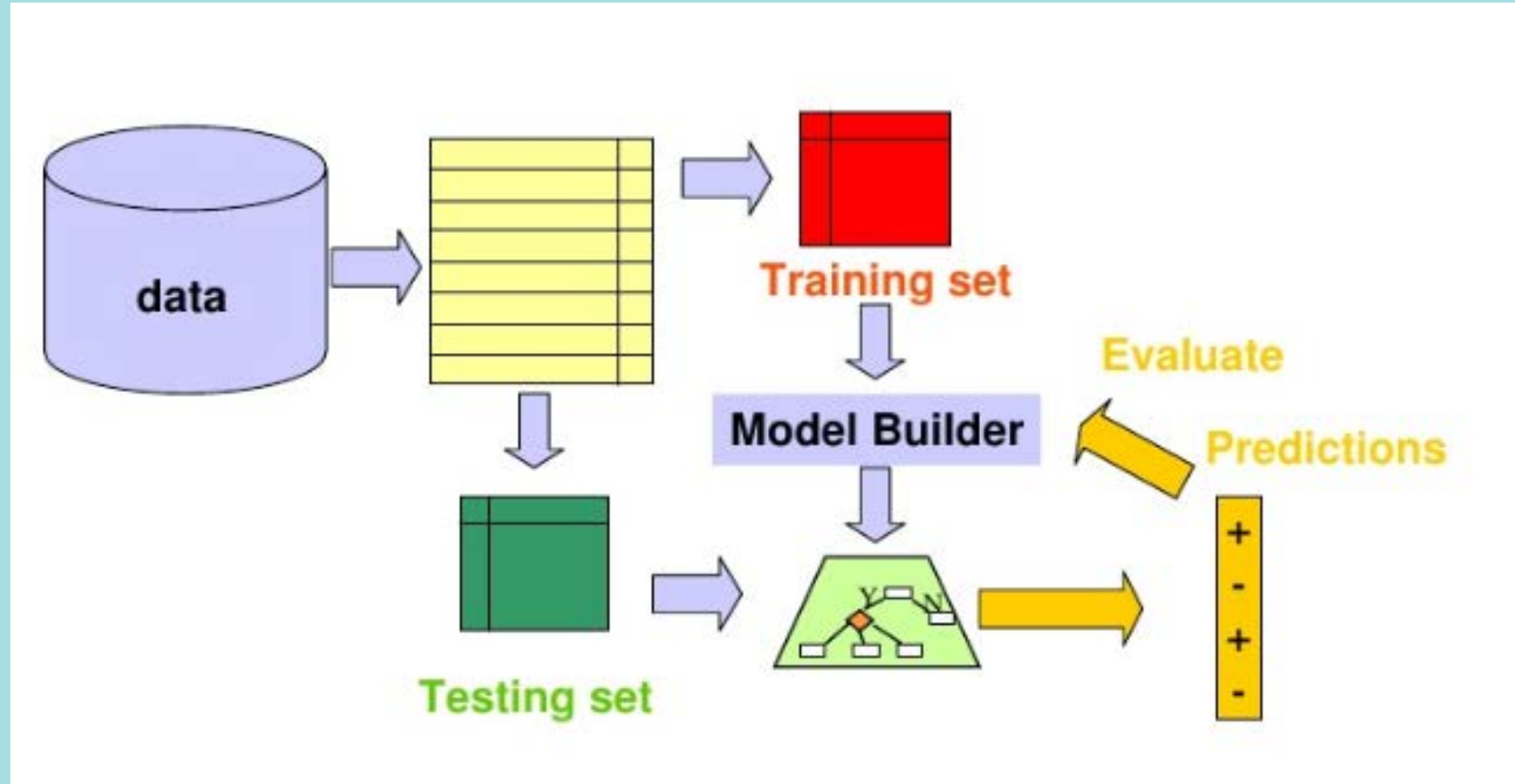
https://developer.android.com/things/

https://codelabs.developers.google.com/codelabs/androidthings-assistant/
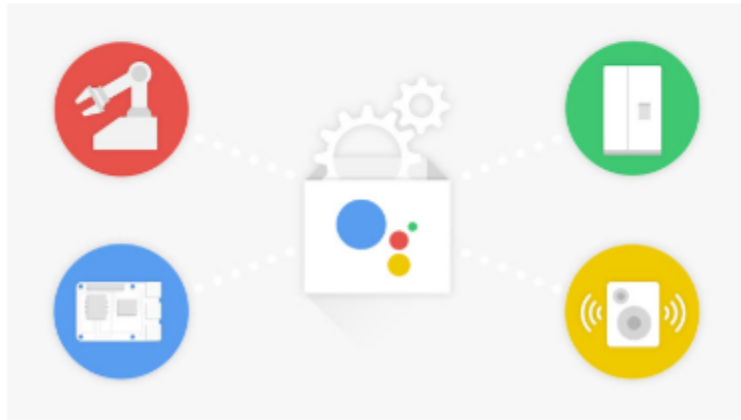
Review2 ： Machine Learning

- Supervised learning
  - Training set/Test set
- Unsupervised learning
- Reinforcement learning
- Test Dataset
- Classification algorithms

Machine Learning

scikit-learn datasets

[load_boston](#)([return_X_y])	Load and return the boston house-prices dataset (regression).
[load_iris](#)([return_X_y])	Load and return the iris dataset (classification).
[load_diabetes](#)([return_X_y])	Load and return the diabetes dataset (regression).
[load_digits](#)([n_class, return_X_y])	Load and return the digits dataset (classification).
[load_linnerud](#)([return_X_y])	Load and return the linnerud dataset (multivariate regression).
[load_wine](#)([return_X_y])	Load and return the wine dataset (classification).
[load_breast_cancer](#)([return_X_y])	Load and return the breast cancer wisconsin dataset (classification).

http://scikit-learn.org/stable/datasets

Iris data

- from sklearn import datasets
- iris = datasets.load_iris()

- 1. sepal length in cm
  2. sepal width in cm
  3. petal length in cm
  4. petal width in cm
  5. class:
  -- Iris Setosa
  -- Iris Versicolour
  -- Iris Virginica

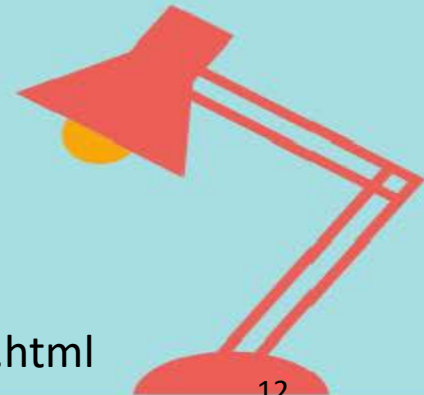| Classes	3
Samples per class	50
Samples total	150
Dimensionality	4
Features	real, positive

Training set/Test set

```
from sklearn.model_selection import train_test_split
from sklearn import datasets
iris = datasets.load_iris()
#print(iris.keys)
X = iris.data[:,0:4]
y = iris.target
X_train, X_test, y_train, y_test =
                        train_test_split(X, y, test_size=0.333)
```
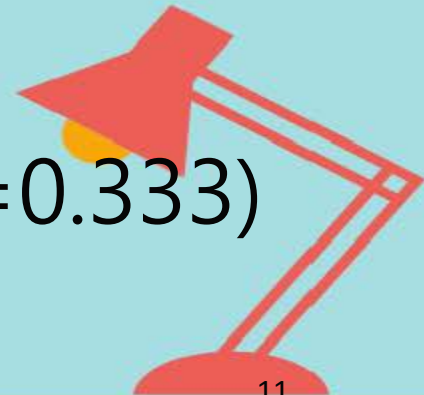
Classification algorithms

- KNN: K-nearest neighbors,
- SVM: Support vector machine
- RF: Random forest
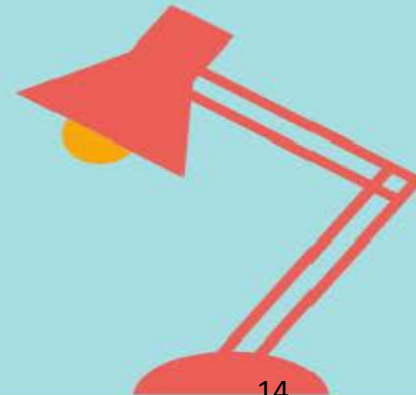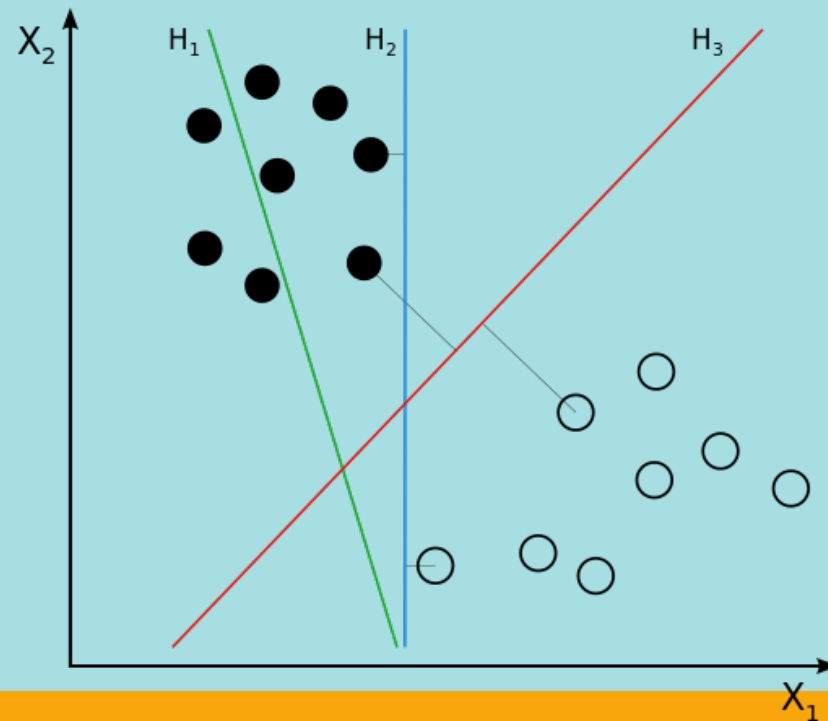- DT: Decision tree
- NN: Neural network (MLP)

http://scikit-learn.org/stable/modules/generated/sklearn.neighbors.KNeighborsClassifier.html

KNN: K-nearest neighbors

- In *k-NN classification*, an object is classified by a majority vote of its neighbors, with the object being assigned to the class most common among its *k* nearest neighbors.
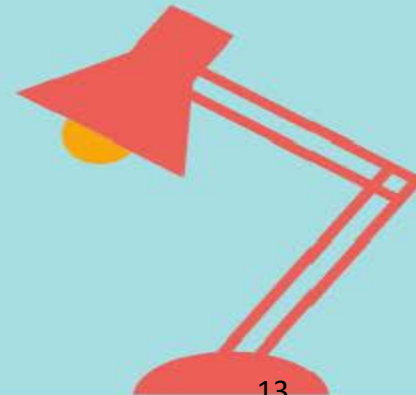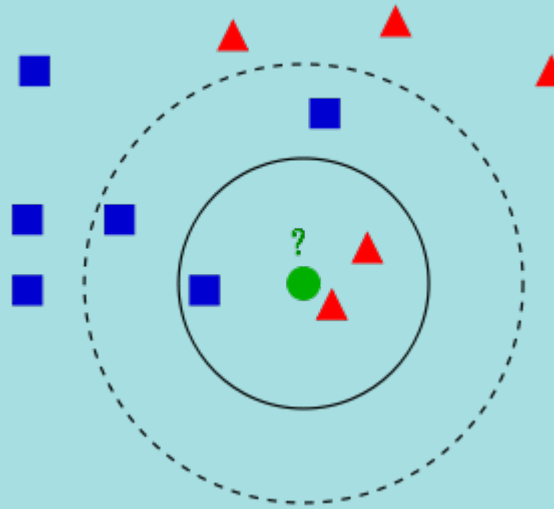
SVM: Support vector machine

- A support vector machine constructs a hyperplane or set of hyperplanes in a high- or infinite-dimensional space

RF: Random forest

- Random forests are an ensemble learning method that operate by constructing a multitude of decision trees at training time and outputting the class that is the mode of the classes (classification) or mean prediction (regression) of the individual trees.
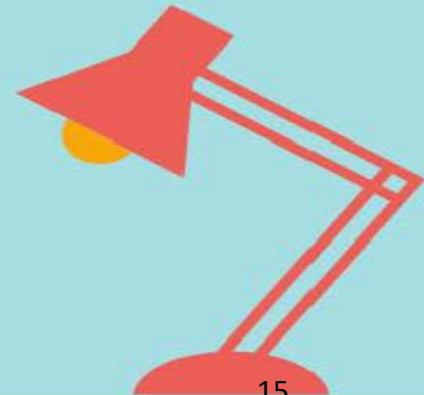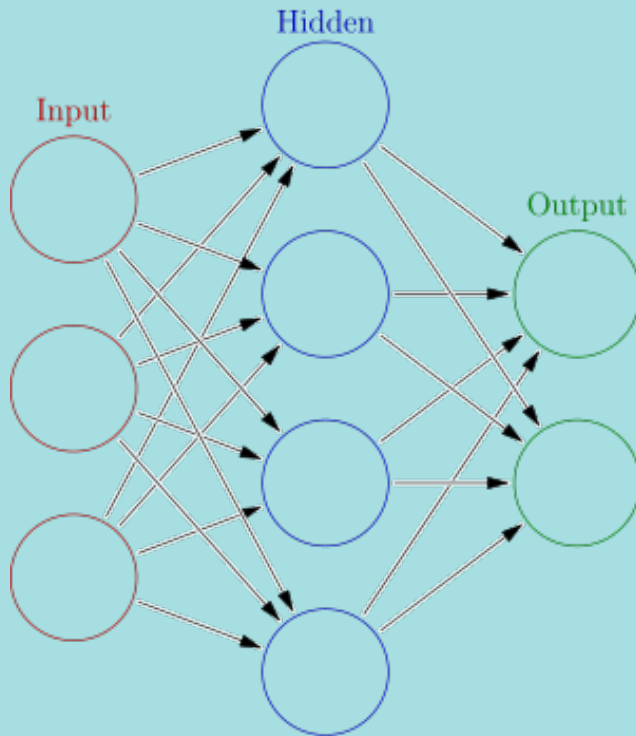
DT: Decision tree

- A decision tree is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences.
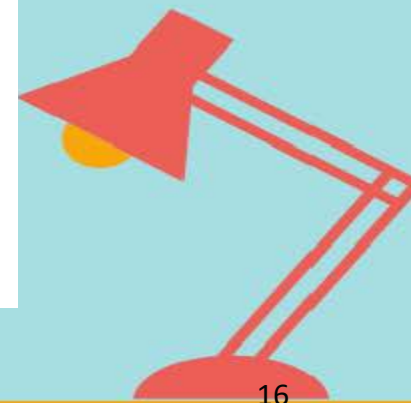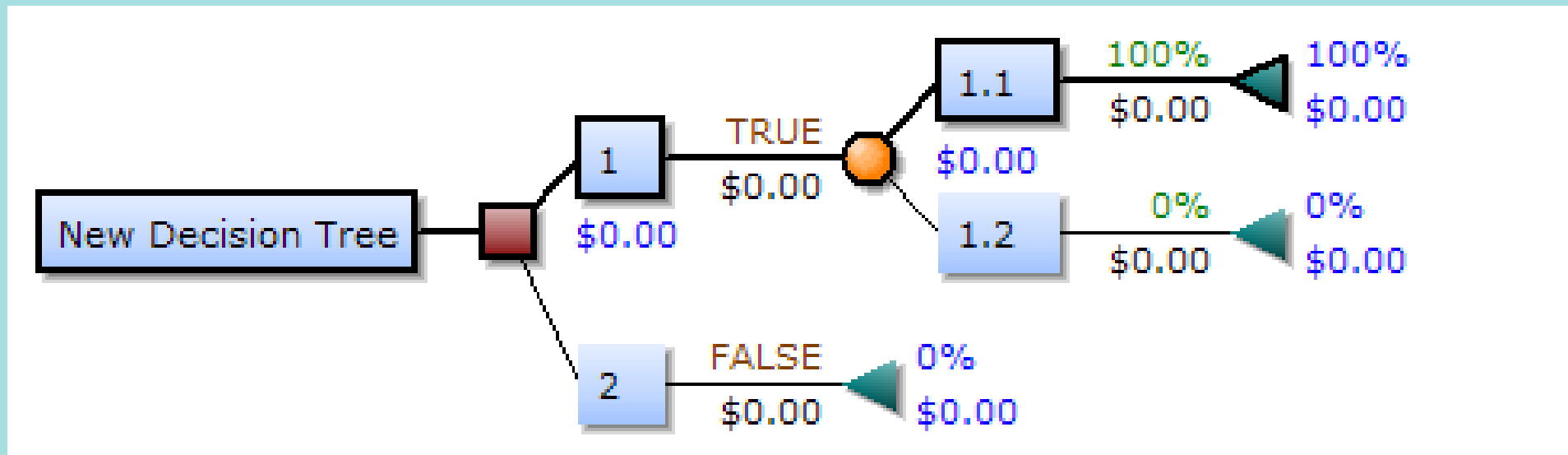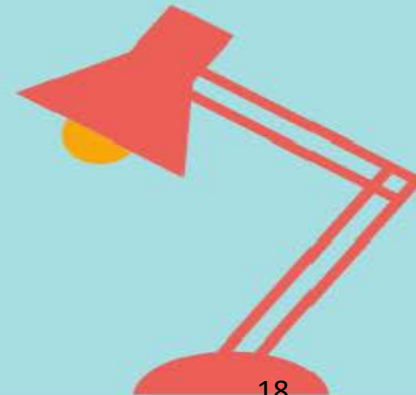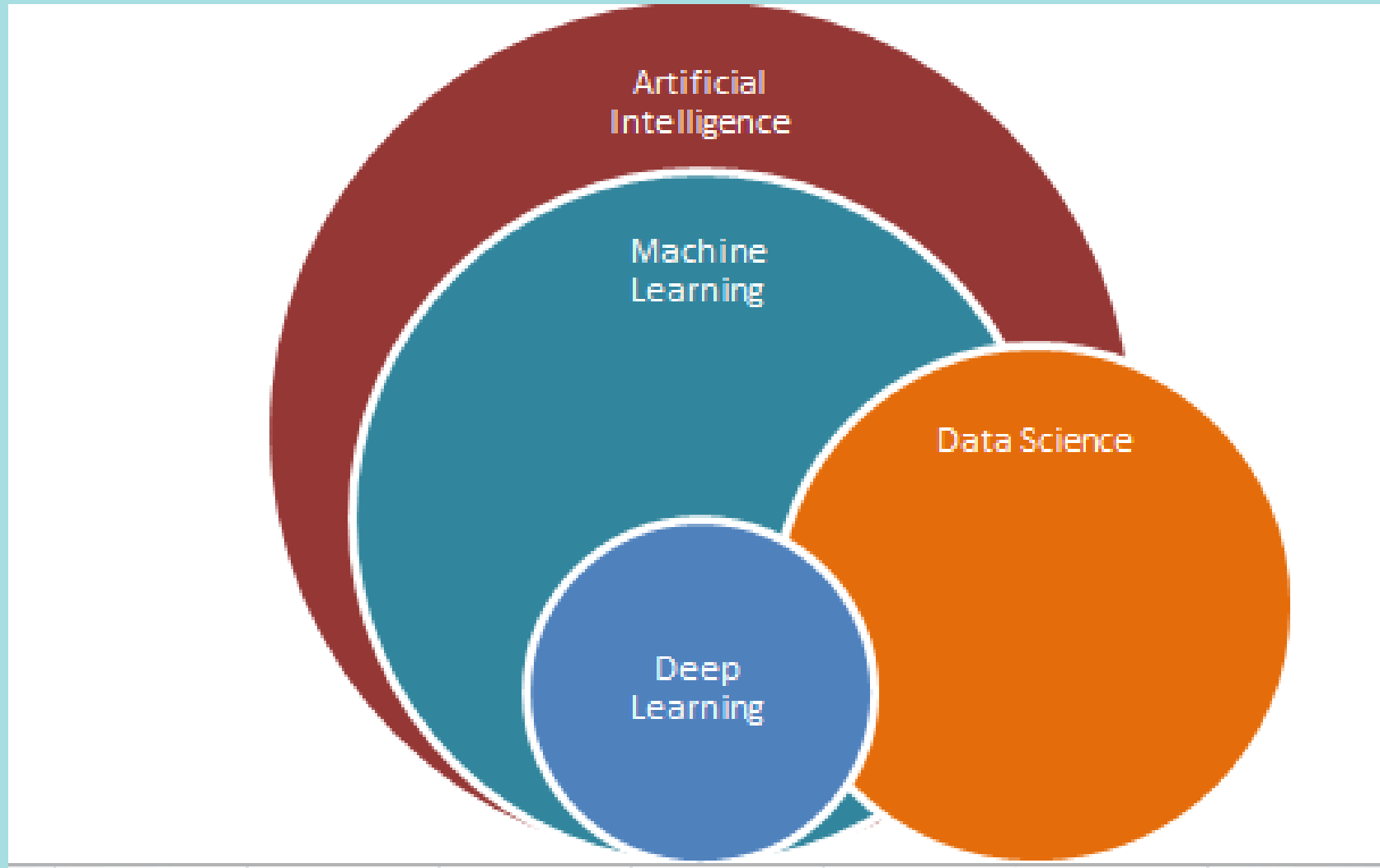
NN: Neural network (MLP)

- A multilayer perceptron (MLP) is a class of feedforward artificial neural network.
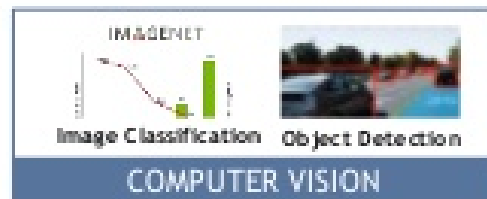
Review 3: Deep Learning

GPU and DL frameworkd

PyTorch vs TensorFlow

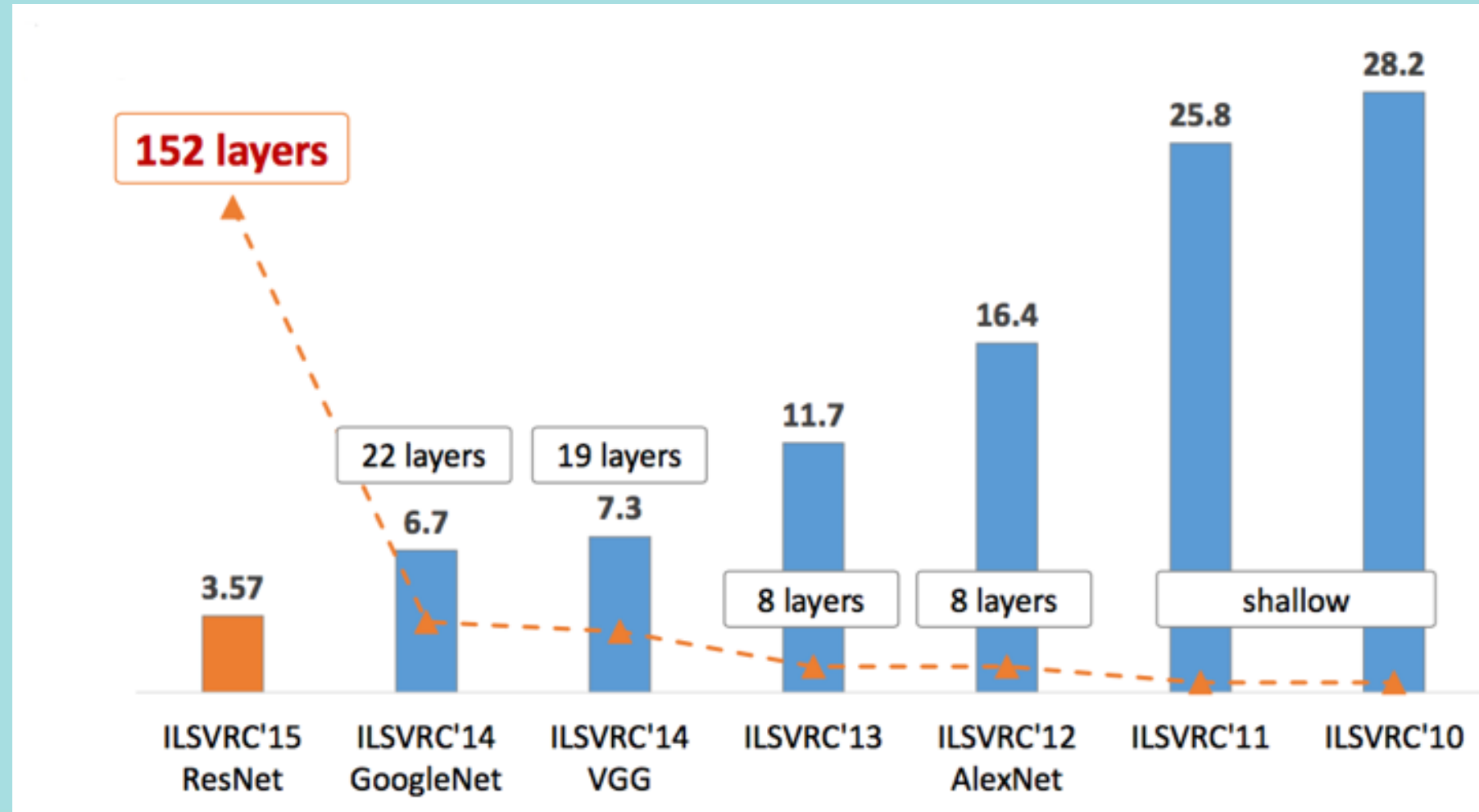
arXiv mentions as of 2018/03/07 (past 3 months)
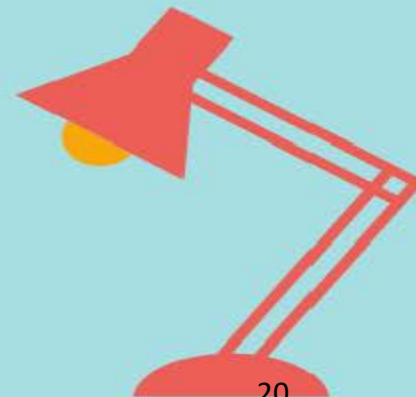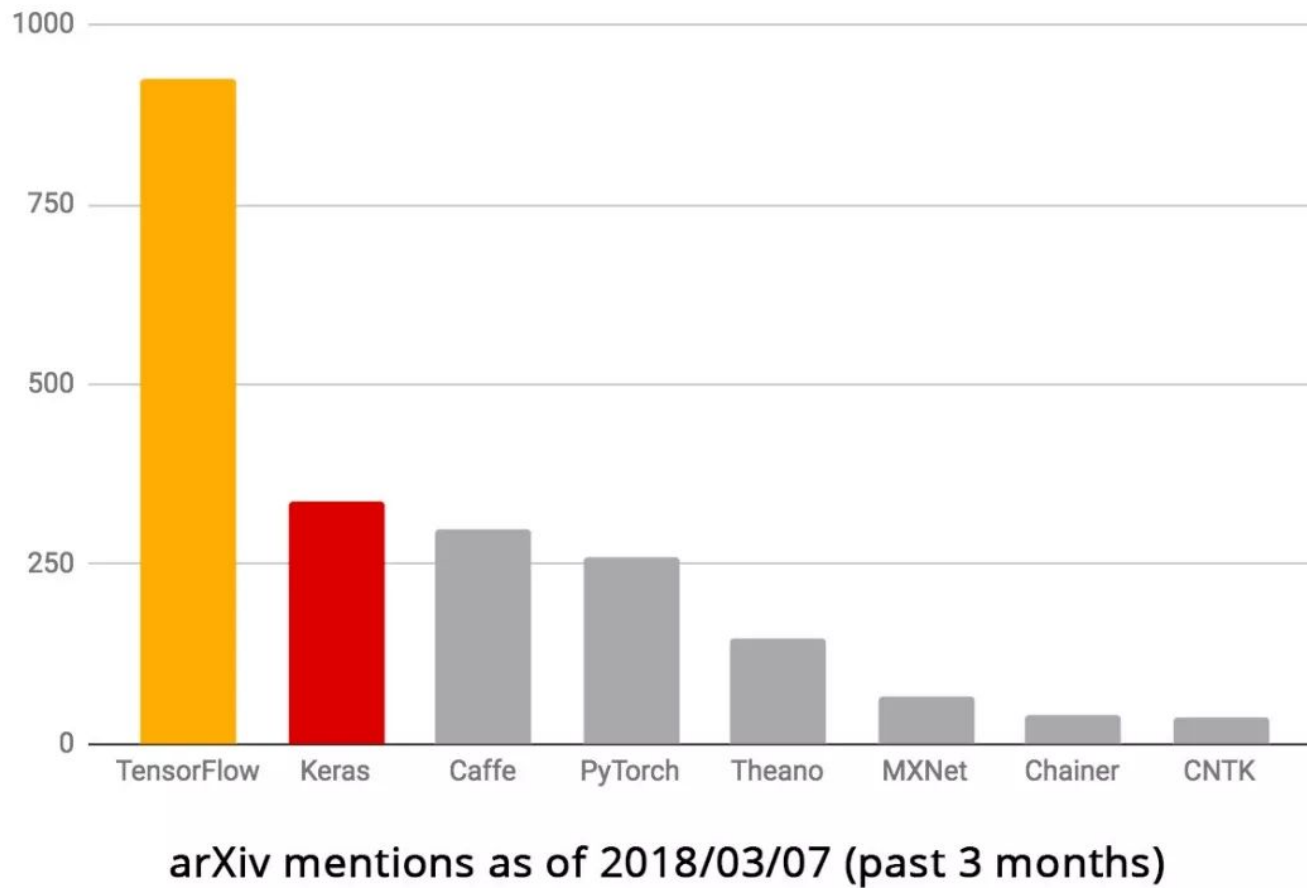
CNN Architectures

- LeNet,
- AlexNet,
- VGG,
- GoogLeNet,
- ResNet

Thanks! Q&A