

# Deep Learning part 2

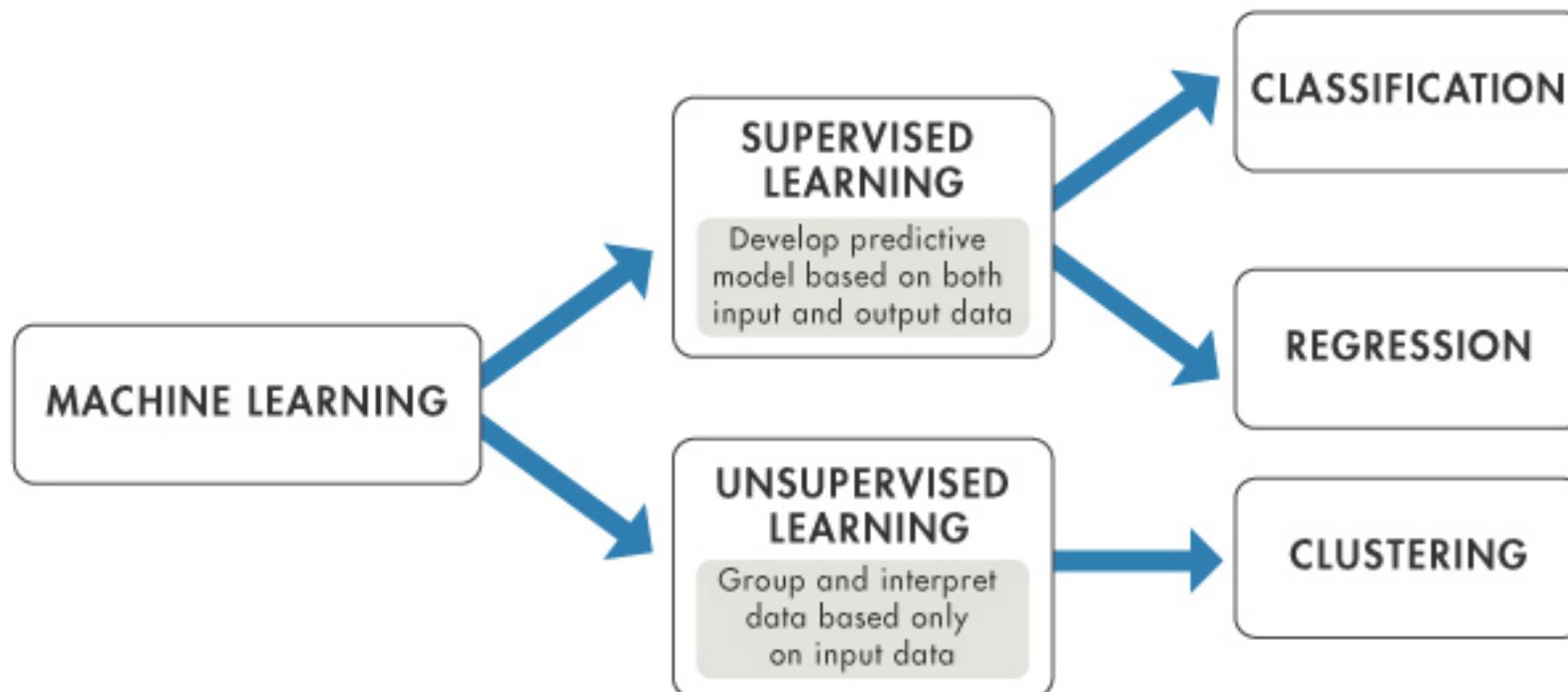
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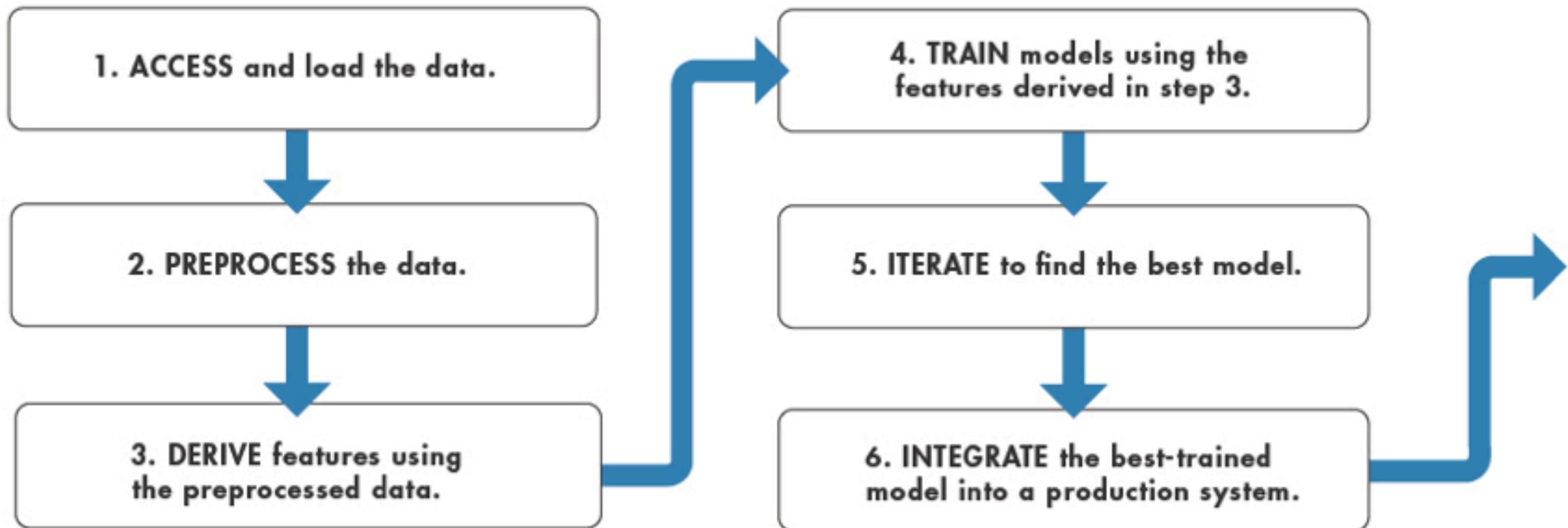
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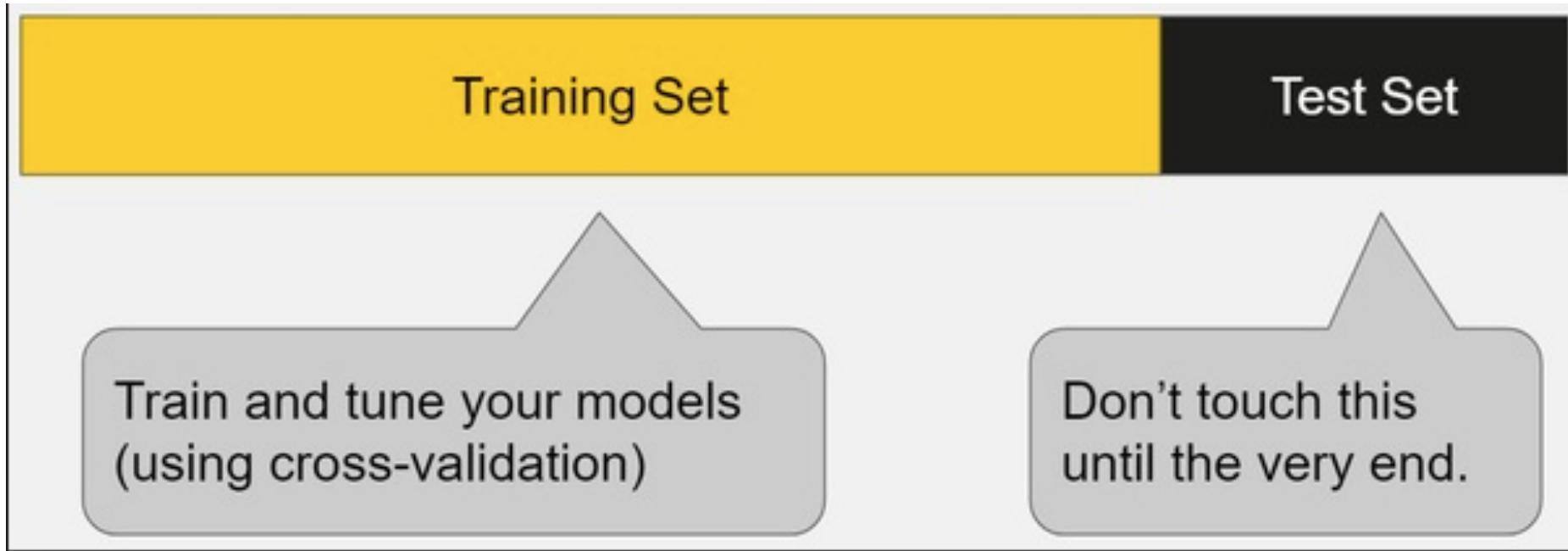
Legchikov Dmitry

# Course plan

- Artificial Neural Networks
- Deep Learning
- MNIST (Image recognition practice)
- Image classification (Transfer Learning practice)
- Reinforcement Learning (OpenAI Gym practice)







# MNIST

label = 5



label = 0



label = 4



label = 1



label = 9



label = 2



label = 1



label = 3



label = 1



label = 4



label = 3



label = 5



label = 3



label = 6



label = 1



label = 7



label = 2



label = 8



label = 6



label = 9



# CIFAR 10

ship



dog



deer



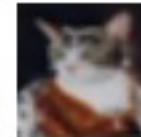
bird



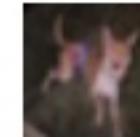
ship



cat



dog



dog



horse



horse



ship



frog



bird



ship



bird



cat



automobile



ship



deer



truck



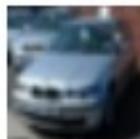
dog



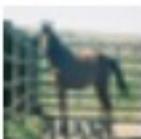
deer



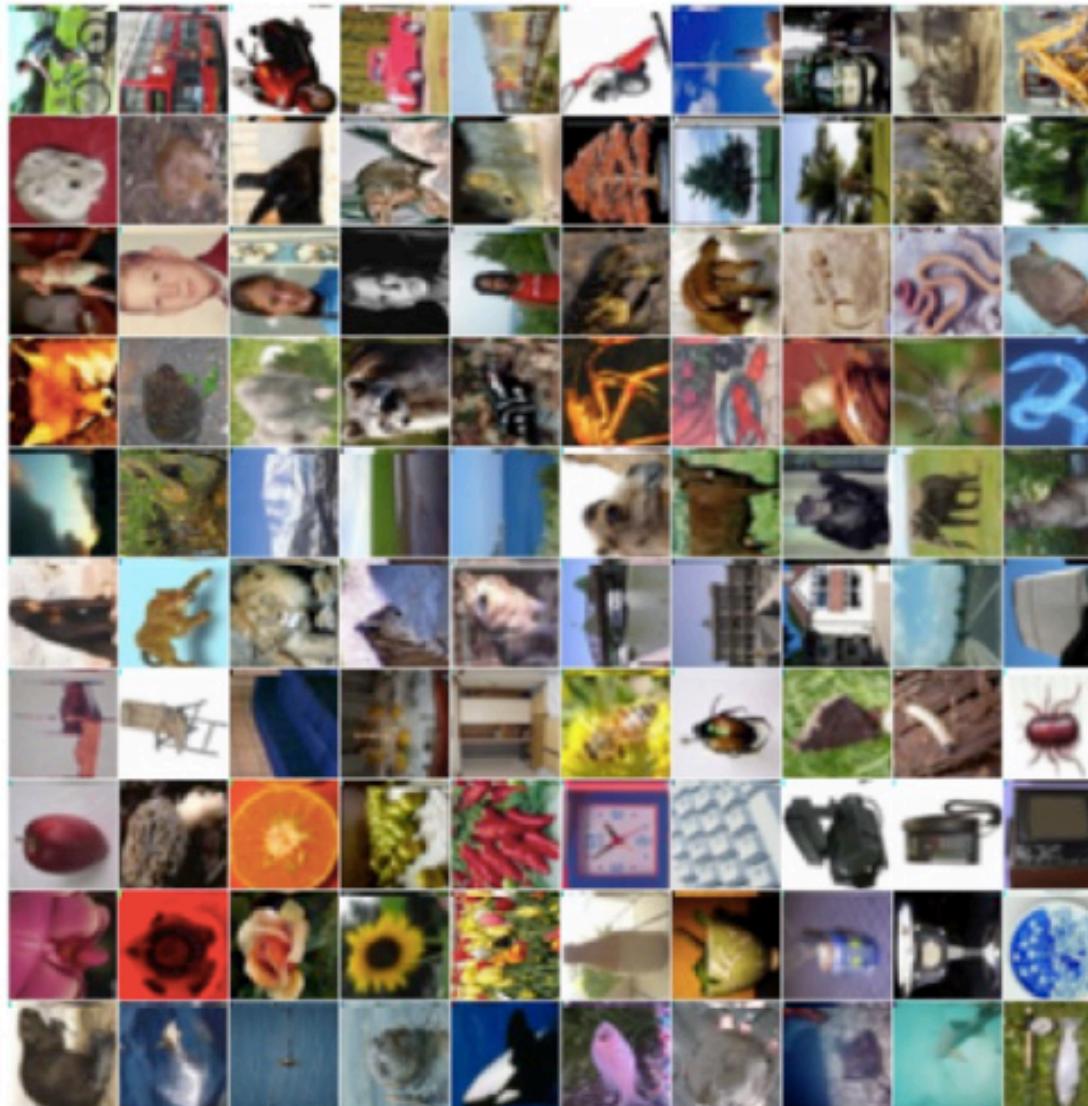
automobile



horse

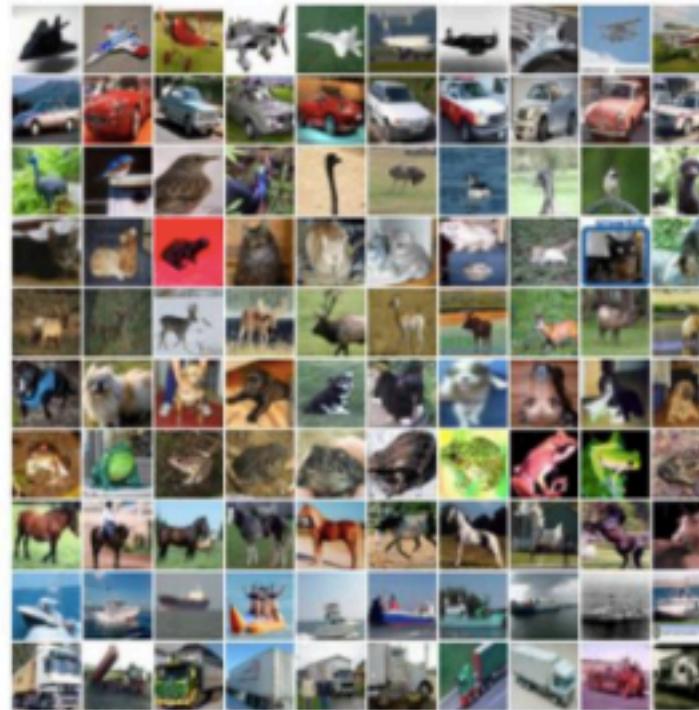


# CIFAR 100

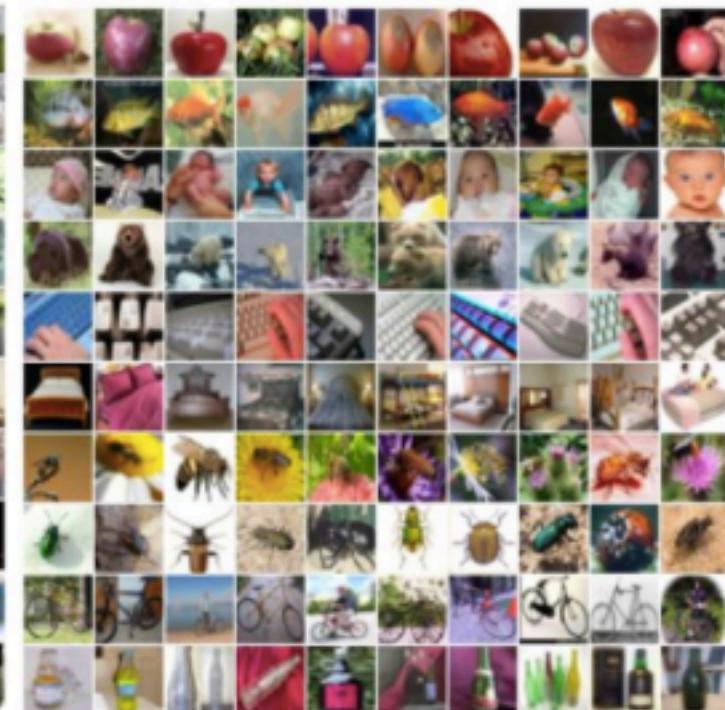




(a) MNIST



(b) CIFAR-10

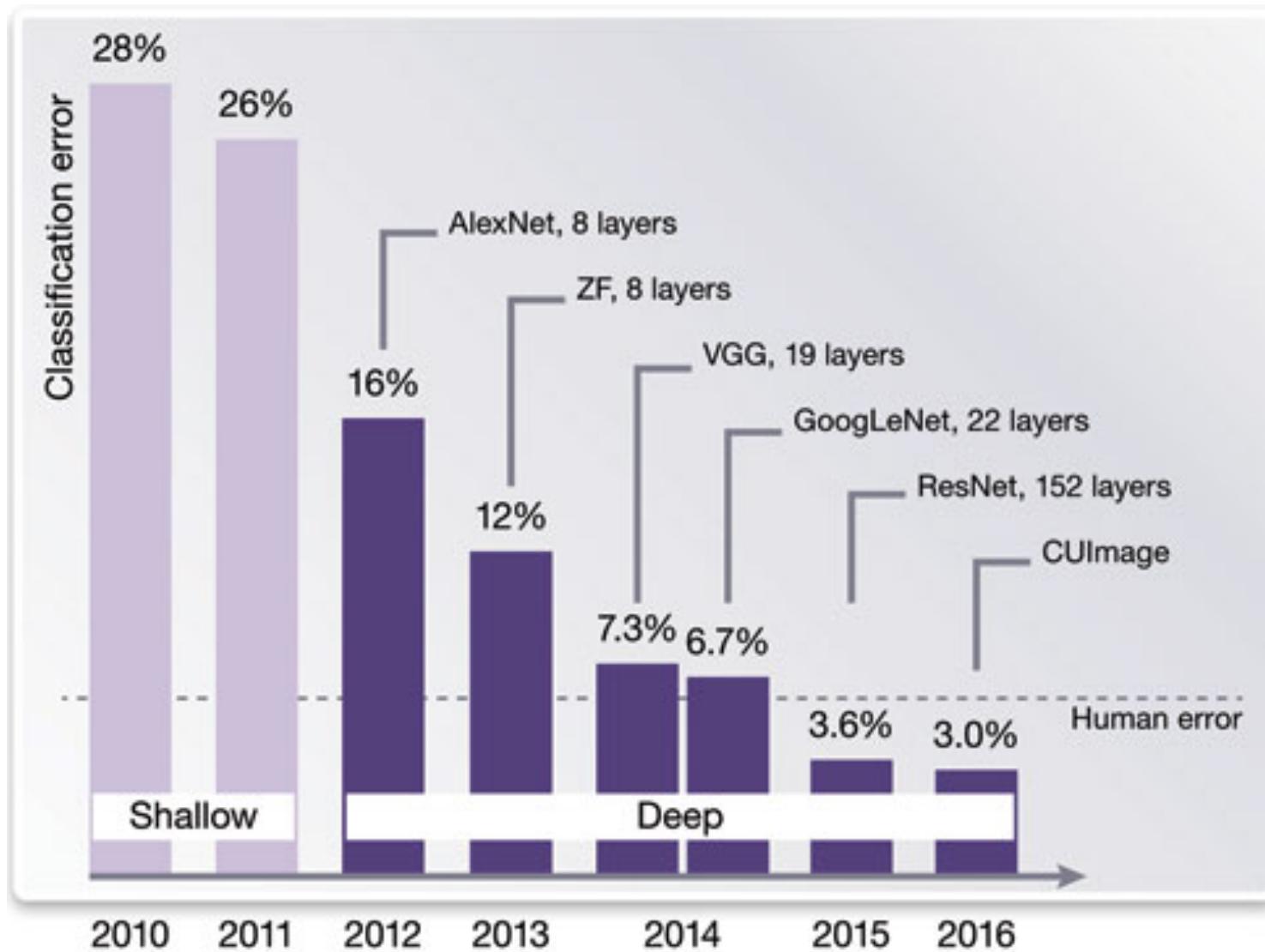


(c) CIFAR-100

# ImageNet



# ImageNet



# ImageNet

Model	ImageNet 2012	ImageNet 2014	ImageNet 2015	ImageNet 2017
AlexNet	15.3%	x	x	x
VGG16	x	7.3%	x	x
GoogLeNet (Inception V1)	x	6.7%	x	x
Inception V2	5.6%	x	x	x
Inception V3	3.58%	x	x	x
ResNet	4.49%	x	3.57%	x
Inception-ResNet (Inception V4)	3.08%	x	x	x
SE-ResNet	x	x	x	2.25%
NASNet	3.8%	x	x	x

Overview of the top-5 error rates on the 2012, 2014, 2015 and 2017 ImageNet challenges.



NETFLIX

# Netflix Prize

**COMPLETED**

[Home](#) | [Rules](#) | [Leaderboard](#) | [Update](#) | [Download](#)

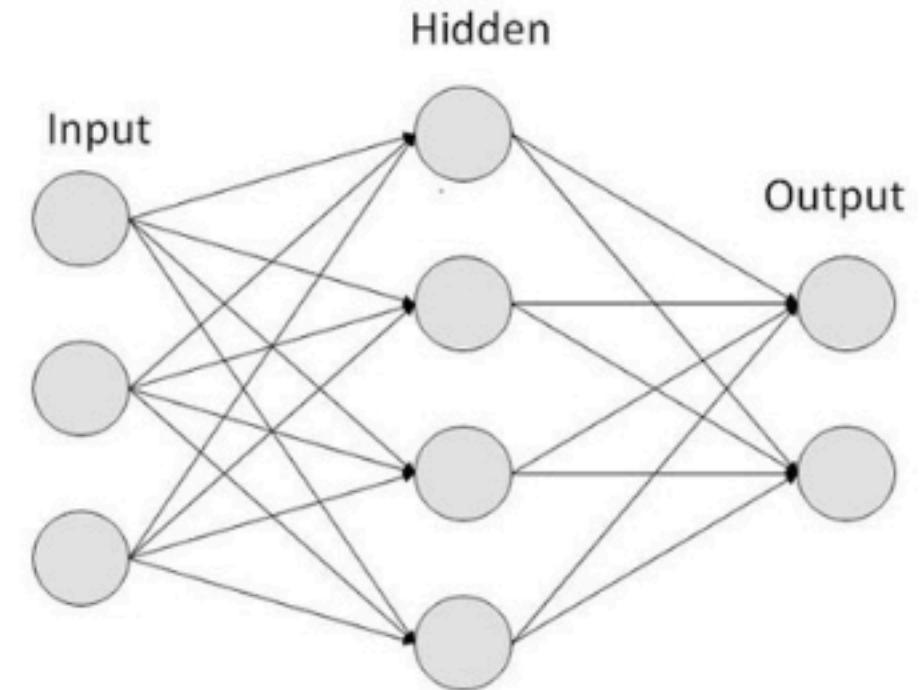
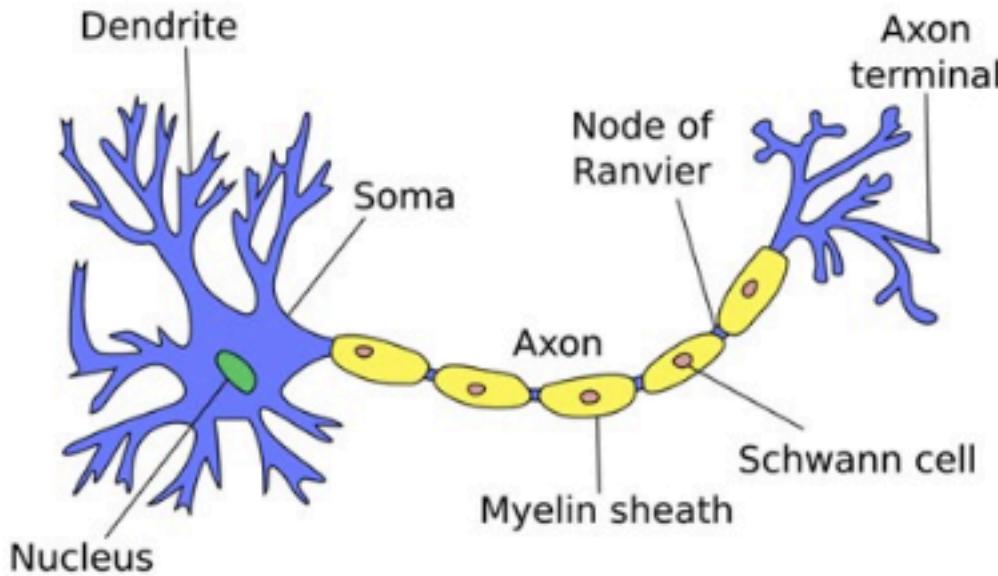
## Leaderboard

Showing Test Score. [Click here to show quiz score](#)

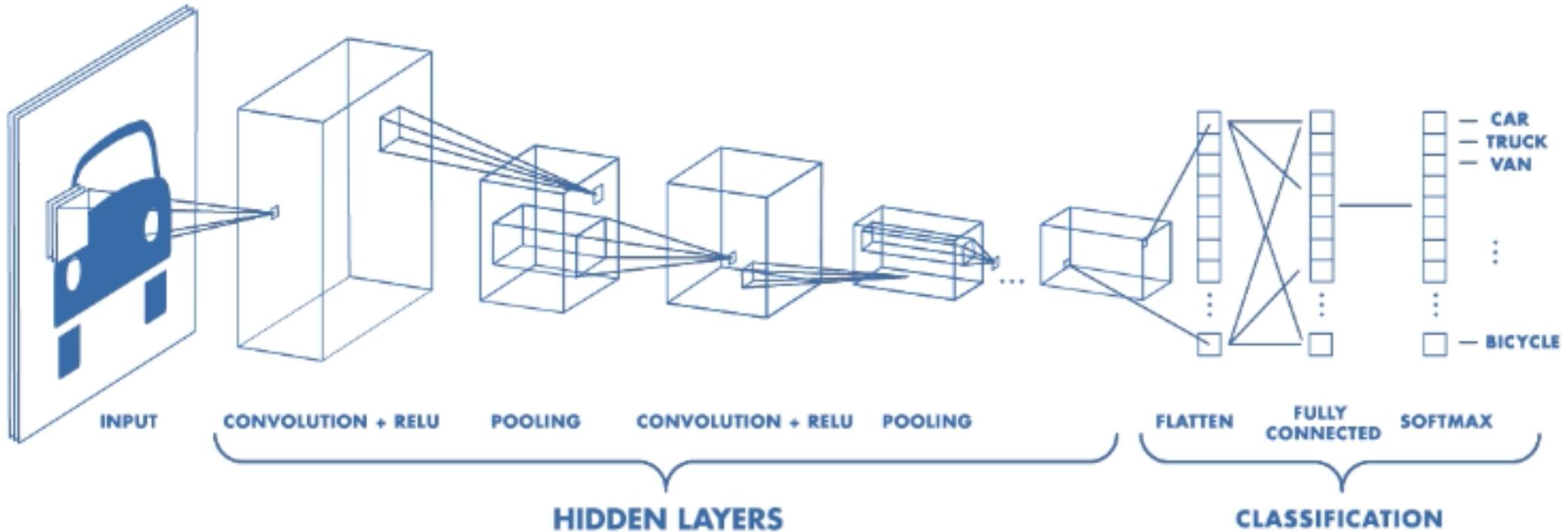
Display top   leaders.

Rank	Team Name	Best Test Score	% Improvement	Best Submit Time
<b><u>Grand Prize - RMSE = 0.8567 - Winning Team: BellKor's Pragmatic Chaos</u></b>				
1	<a href="#">BellKor's Pragmatic Chaos</a>	0.8567	10.06	2009-07-26 18:18:28
2	<a href="#">The Ensemble</a>	0.8567	10.06	2009-07-26 18:38:22
3	<a href="#">Grand Prize Team</a>	0.8582	9.90	2009-07-10 21:24:40
4	<a href="#">Opera Solutions and Vandelay United</a>	0.8588	9.84	2009-07-10 01:12:31
5	<a href="#">Vandelay Industries!</a>	0.8591	9.81	2009-07-10 00:32:20
6	<a href="#">PragmaticTheory</a>	0.8594	9.77	2009-06-24 12:06:56
7	<a href="#">BellKor in BigChaos</a>	0.8601	9.70	2009-05-13 08:14:09
8	Dace	0.8612	9.59	2009-07-24 17:18:43

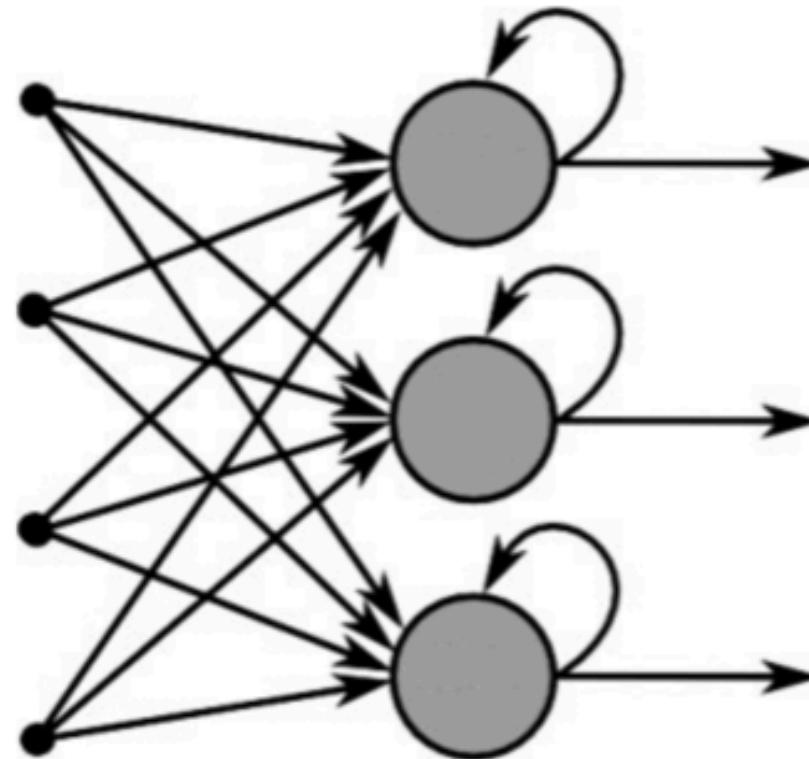
# Multilayer Perceptron



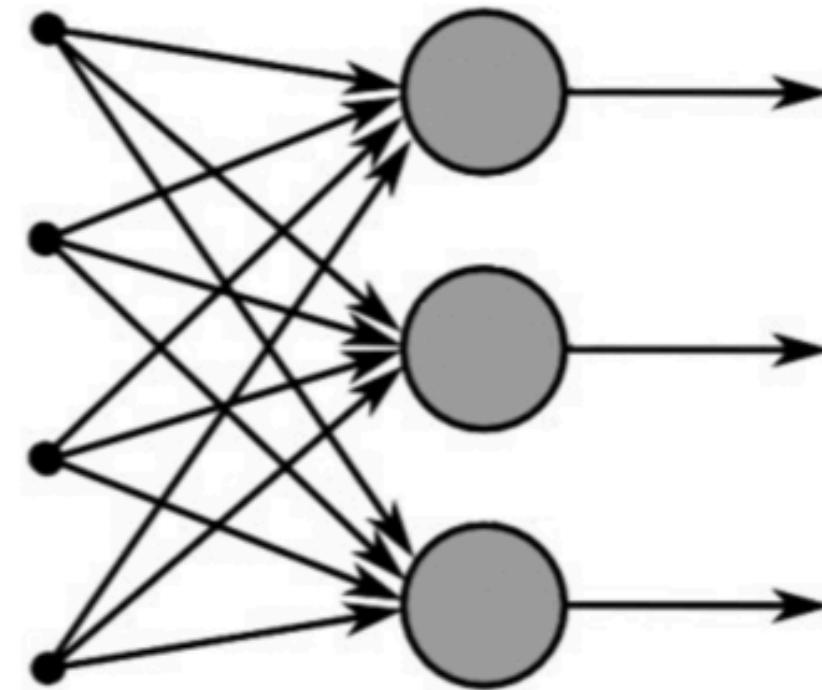
# Convolution Neural Networks (CNN)



# Recurrent Neural Networks (RNN)

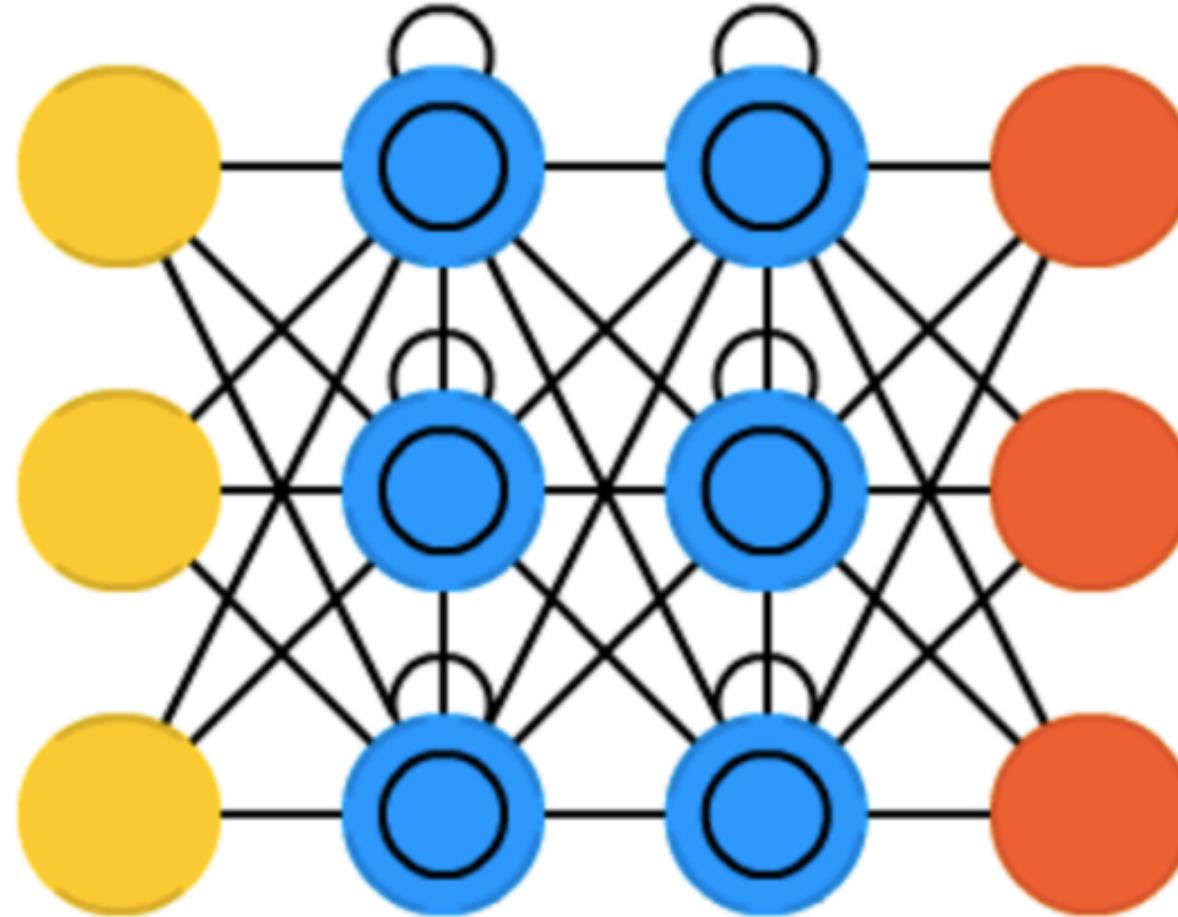


Recurrent Neural Network

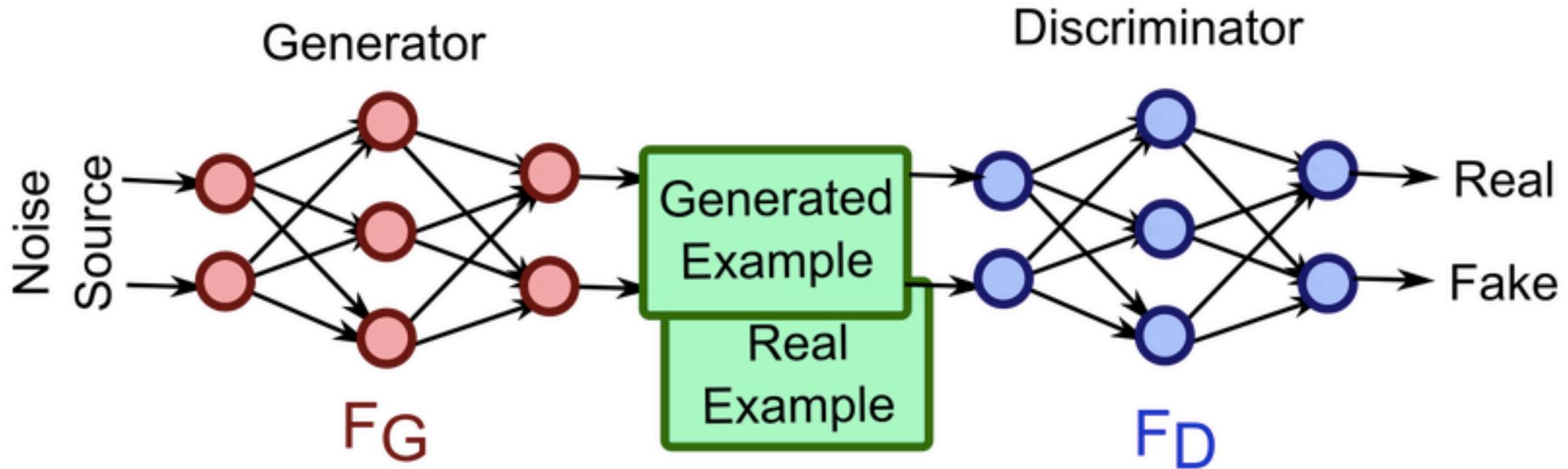


Feed-Forward Neural Network

# Long Short Term Memory (LSTM)



# Generative Adversarial Network (GAN)



# Kaggle



# Kaggle Kernels

The screenshot shows a Jupyter Notebook interface running on a Kaggle Kernel. The title bar says "jupyter quora (autosaved)". The menu bar includes File, Edit, View, Insert, Cell, Kernel, Widgets, and Help. The toolbar has icons for New, Open, Save, Run, Stop, Kernel, Cell, CellToolbar, and CellToolbar. A status bar at the bottom shows "Python 3".

In the main area, a cell titled "In [1]" contains the following Python code:

```
# This Python 3 environment comes with many helpful analytics libraries installed
# It is defined by the kaggle/python docker image: https://github.com/kaggle/docker-python
# For example, here's several helpful packages to load in

import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import matplotlib.pyplot as plt
import seaborn as sns

color = sns.color_palette()

%matplotlib inline

pd.options.mode.chained_assignment = None # default='warn'

# Input data files are available in the "../input/" directory.
# For example, running this (by clicking run or pressing Shift+Enter) will list the files in the input directory

from subprocess import check_output
#print(check_output(["ls", "../input"]).decode("utf8"))

train_df = pd.read_csv("../input/train.csv")
test_df = pd.read_csv("../input/test.csv")

print(train_df.shape)
print(test_df.shape)

# Any results you write to the current directory are saved as output.
```

To the right of the notebook, there is a sidebar titled "Kernel Hub". It shows a "Create or select file" dialog. The "Repository Contents" section lists the following files:

- Quora
- updates.ipynb
- some updates on quora.ipynb
- script.py
- quora.ipynb
- kernel.py
- kernel-hr-satisfaction.py.ipynb
- introduction.ipynb
- first-kernel.ipynb
- file.ipynb
- .gitignore

At the bottom of the sidebar, there are "Create new file" and "Cancel" buttons.

# Google Colaboratory



# Let's practice!