

СУЧАСНІ КОМП'ЮТЕРНІ ТЕХНОЛОГІЇ

Artificial intelligence

Р.В. Єрмоленко

Онлайн-курсы

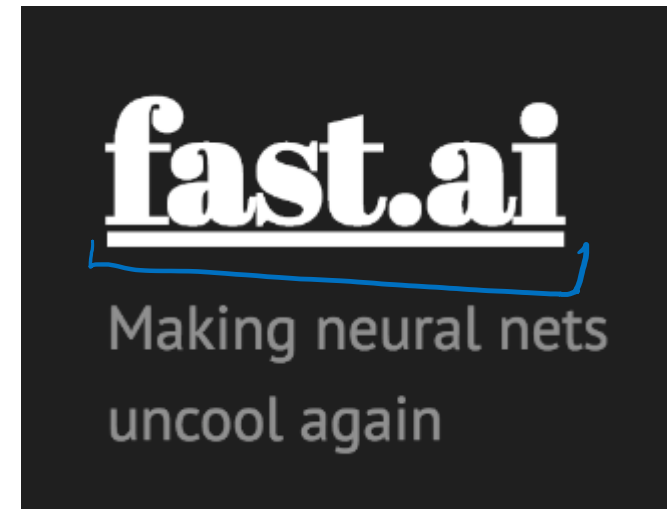
CS231n: Convolutional Neural Networks for Visual Recognition

Spring 2017

cs231n.stanford.edu

CS224d: Deep Learning for Natural Language Processing

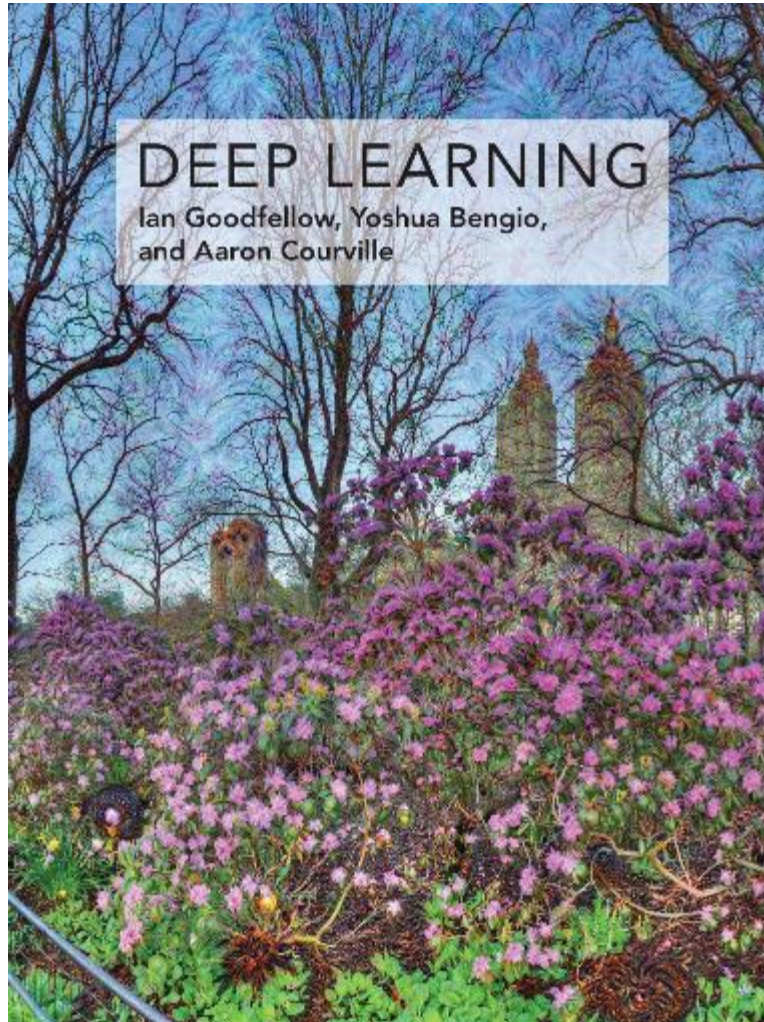
cs231n.stanford.edu



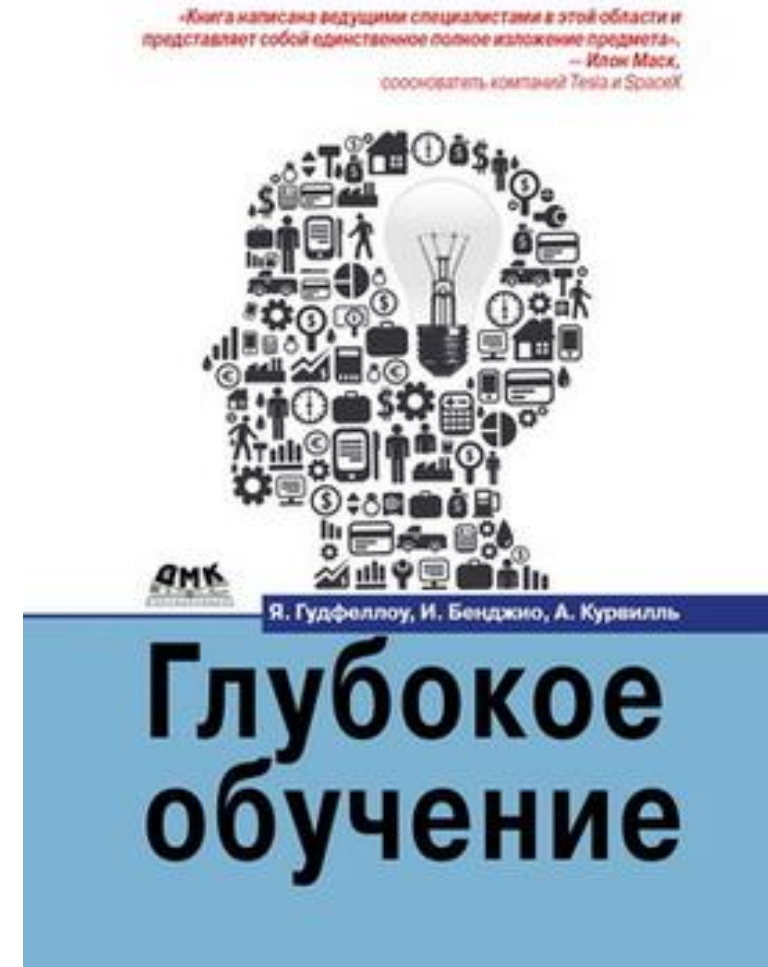
Coursera ← Andrew Ng
Coursera

fast.ai

Книга



deeplearningbook.org



dmkpress.com

Практичні завдання

[CS231n Convolutional Neural Networks for Visual Recognition](#)

<http://cs231n.github.io/assignments2018/assignment1/>

<http://cs231n.github.io/linear-classify/>

In this assignment you will practice putting together a simple image classification pipeline, based on the k-Nearest Neighbor or the SVM/Softmax classifier. The goals of this assignment are as follows:

- understand the basic Image Classification pipeline and the data-driven approach (train/predict stages)

- understand the train/val/test splits and the use of validation data for hyperparameter tuning.

- develop proficiency in writing efficient vectorized code with numpy

- implement and apply a k-Nearest Neighbor (kNN) classifier

- implement and apply a Multiclass Support Vector Machine (SVM) classifier

- implement and apply a Softmax classifier

- implement and apply a Two layer neural network classifier

- understand the differences and tradeoffs between these classifiers

- get a basic understanding of performance improvements from using higher-level representations than raw pixels (e.g. color histograms, Histogram of Gradient (HOG) features)

Definition of ARTIFICIAL INTELLIGENCE

- 1 : a branch of computer science dealing with the simulation of intelligent behavior in computers
- 2 : the capability of a machine to imitate intelligent human behavior

[Merriam-Webster](#)

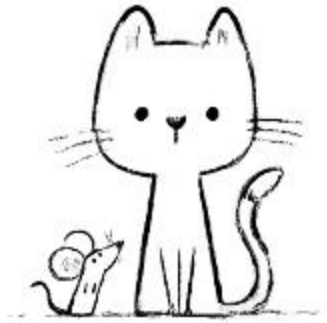
Штучний інтелект — розділ комп'ютерної лінгвістики та інформатики, що займається формалізацією проблем та завдань, які нагадують завдання, виконувані людиною. При цьому, у більшості випадків алгоритм розв'язання завдання невідомий наперед. Точного визначення цієї науки немає, оскільки у філософії не розв'язане питання про природу і статус людського інтелекту. Немає і точного критерію досягнення комп'ютером «розумності», хоча перед штучним інтелектом було запропоновано низку гіпотез, наприклад, тест Тюринга або гіпотеза Ньюела-Саймона. Нині існує багато підходів як до розуміння задач штучного інтелекту, так і до створення інтелектуальних систем.

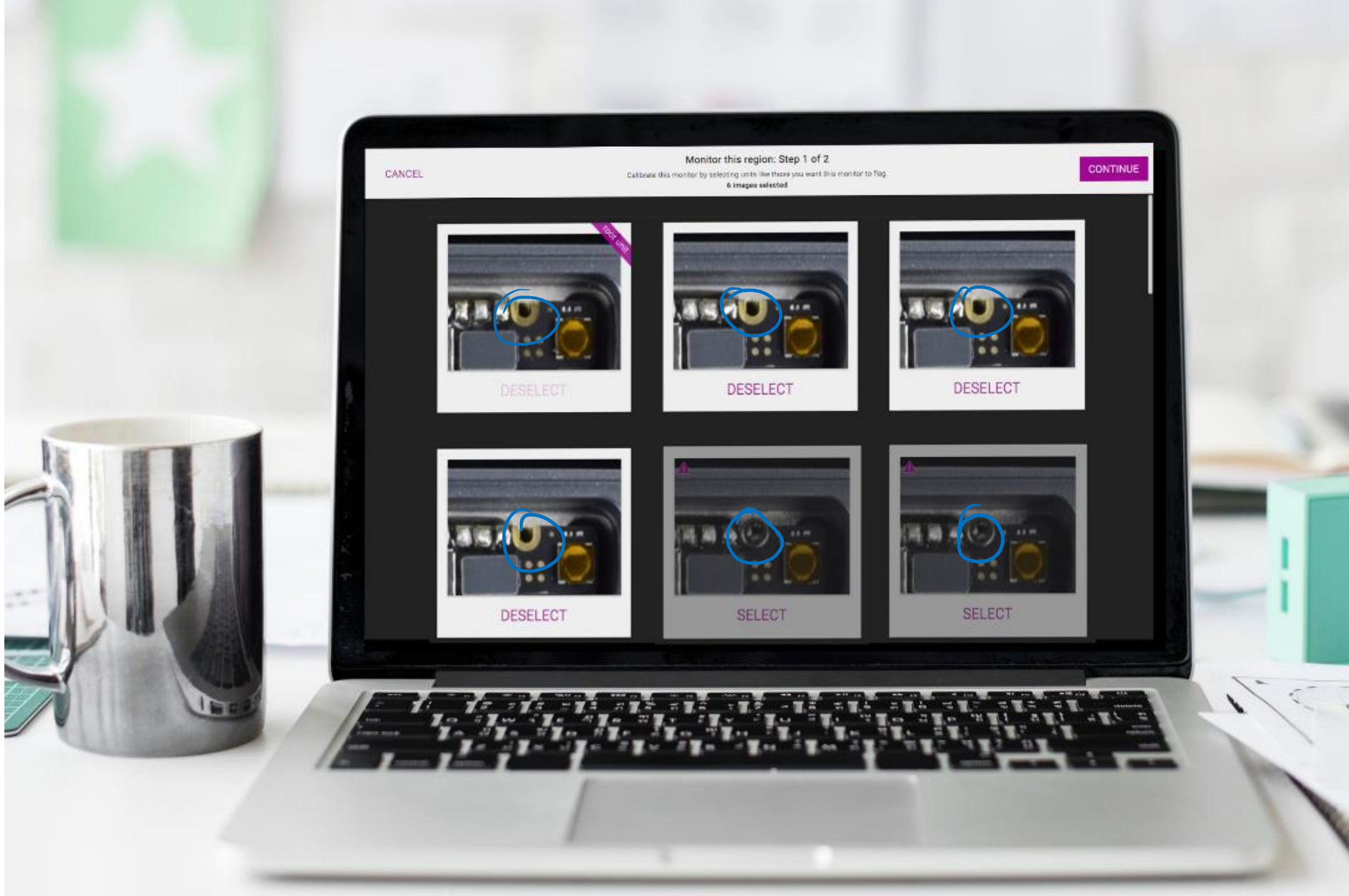




OCR Optical Character Recognition







IMAGENET

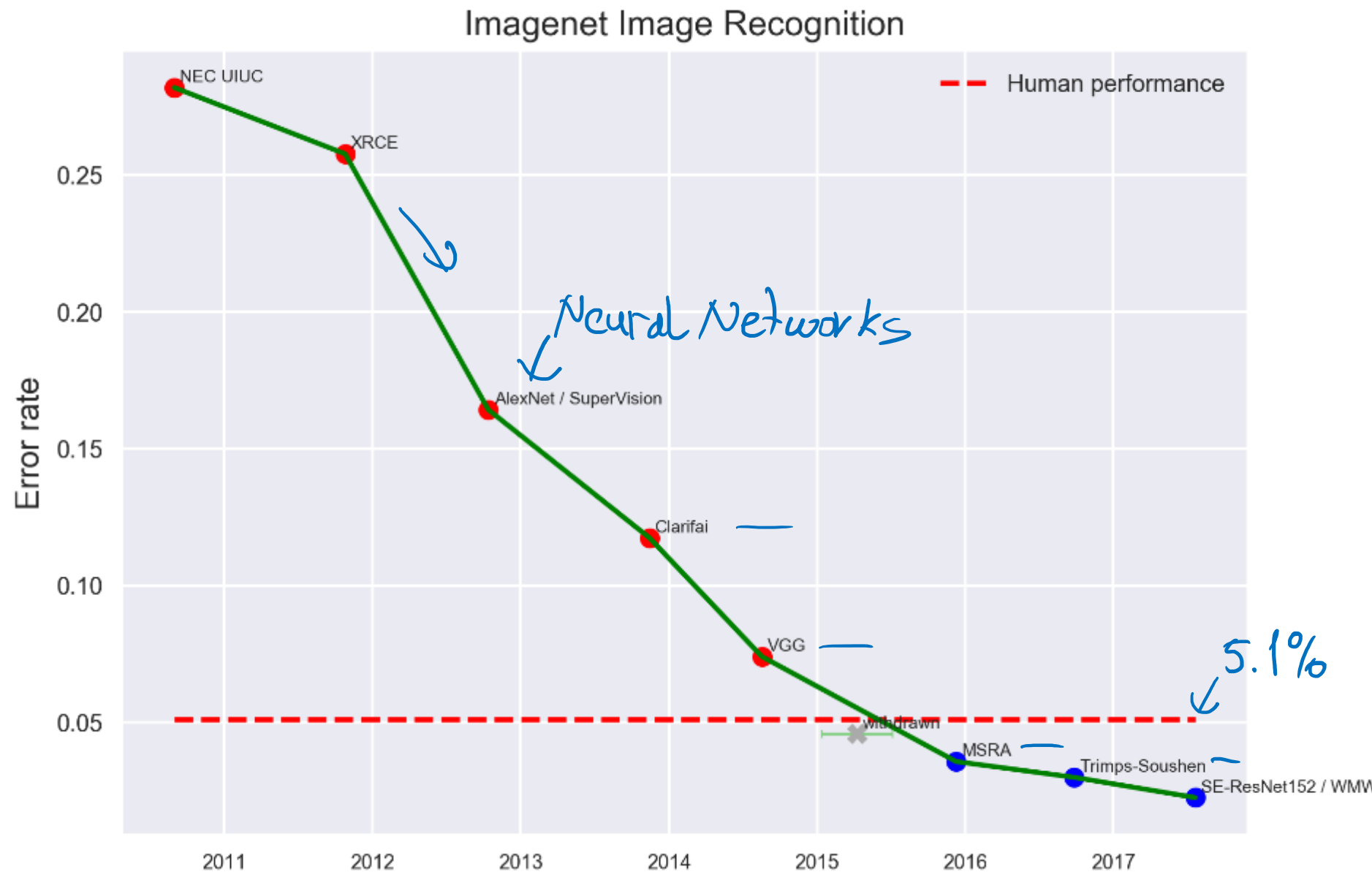
transfer learning

1M
1000 classes

20M

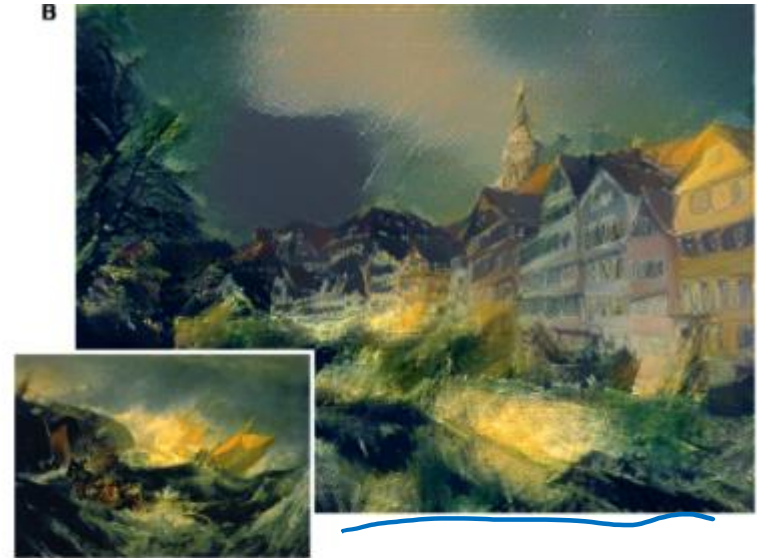


Распознавание изображений

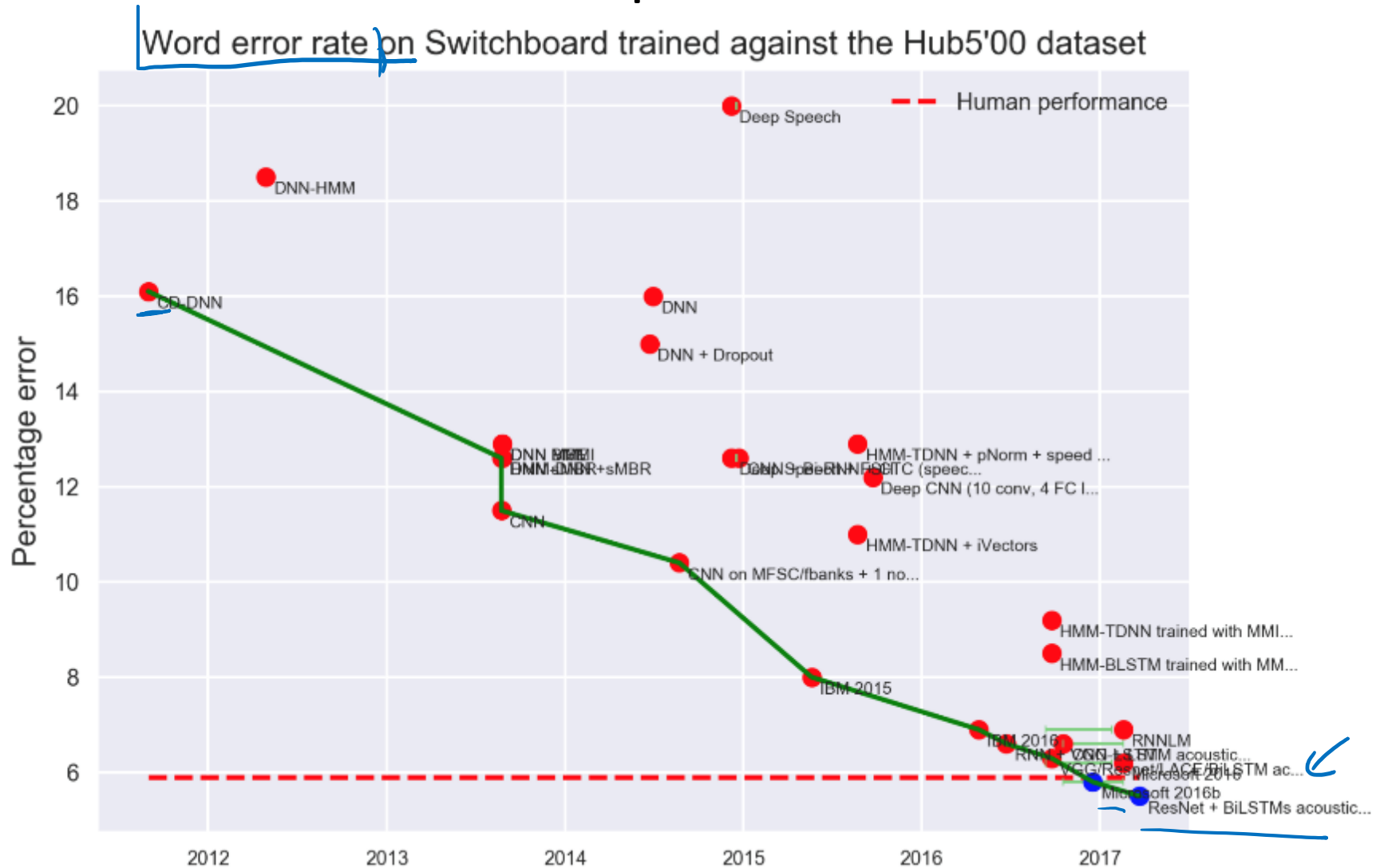


Neural Style Transfer

Prisma



Распознавание речи





Siri



Cortana



Alexa



Google Now

Машинный перевод

Kilimanjaro is 19,710 feet of the mountain covered with snow, and it is said that the highest mountain in Africa. Top of the west, “Ngaje Ngai” in the Maasai language, has been referred to as the house of God. The top close to the west, there is a dry, frozen carcass of a leopard. Whether the leopard had what the demand at that altitude, there is no that nobody explained.

go



После →

Kilimanjaro is a mountain of 19,710 feet covered with snow and is said to be the highest mountain in Africa. The summit of the west is called “Ngaje Ngai” in Masai, the house of God. Near the top of the west there is a dry and frozen dead body of leopard. No one has ever explained what leopard wanted at that altitude.

Web search



<https://m.habrahabr.ru/company/yandex/blog/336094/>

Обучение с подкреплением - Го

Агент



20



Машинное обучение

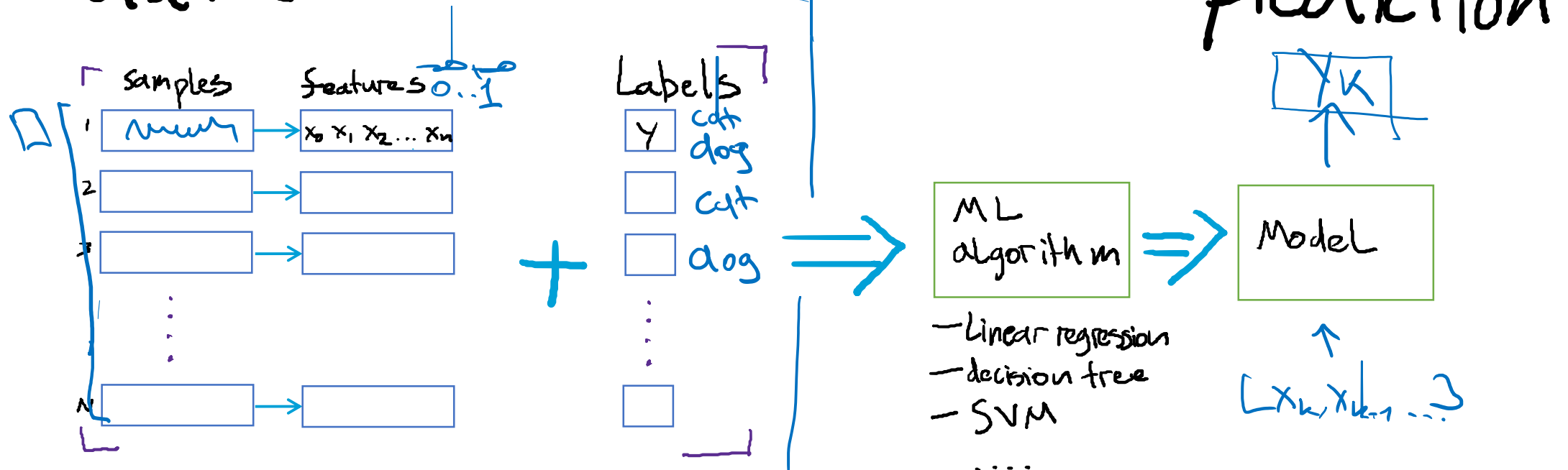
Machine Learning

Machine learning is a field of [computer science](#) that gives [computers](#) the ability to learn without being explicitly programmed.^[1]

[Wikipedia](#)

обучение с учителем
data

Supervised Learning



Машинное обучение Machine Learning

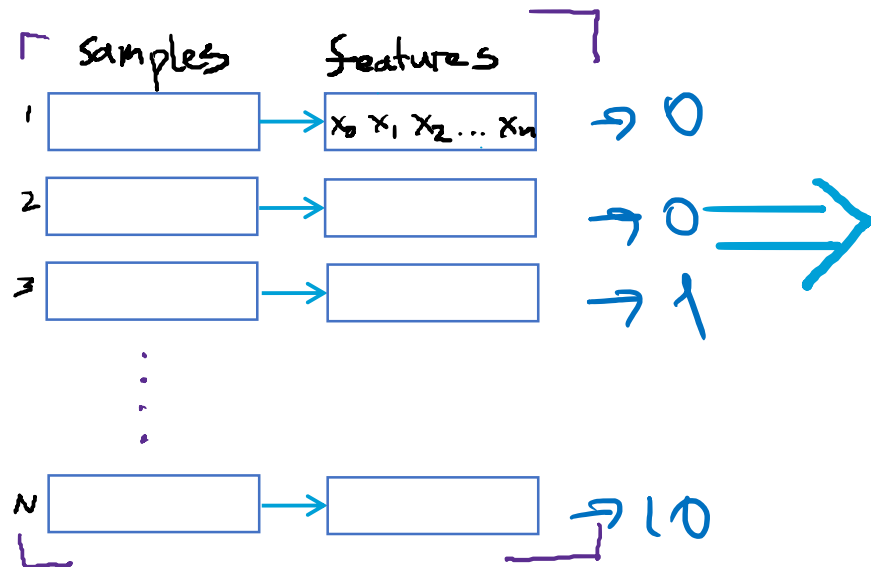
Machine learning is a field of **computer science** that gives **computers** the ability to learn without being explicitly programmed.^[1]

[Wikipedia](#)

обучение без учителя
data

Unsupervised Learning

decision



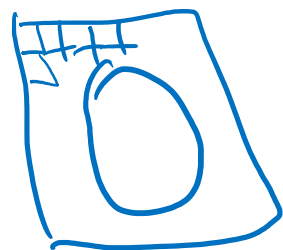
ML
algorithm

- clustering
- outlier detection
- ...

⇒ Model

MNIST

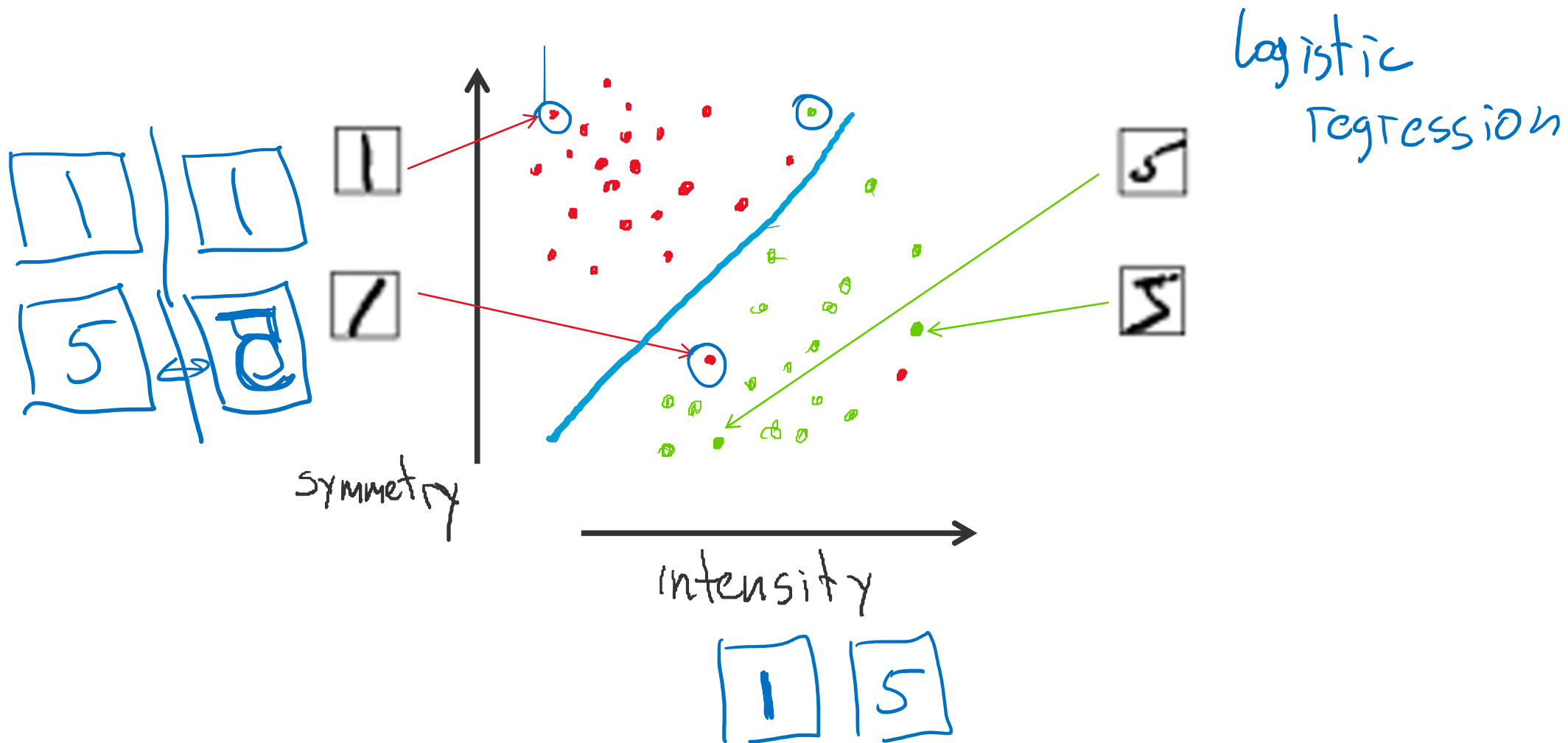
USPS



0	1	2	3	4	5	6	7	8	9
0	4	1	9	2	1	3	1	4	3
5	3	6	1	7	2	8	6	9	4
0	9	1	1	2	4	3	2	7	3
8	6	9	0	5	6	0	7	6	1
8	7	9	3	9	8	5	9	3	3
0	7	4	9	8	0	9	4	1	4
4	6	0	4	5	6	1	0	0	1
7	1	6	3	0	2	1	1	7	9
0	2	6	7	8	3	9	0	4	6
7	4	6	8	0	7	8	3	1	5

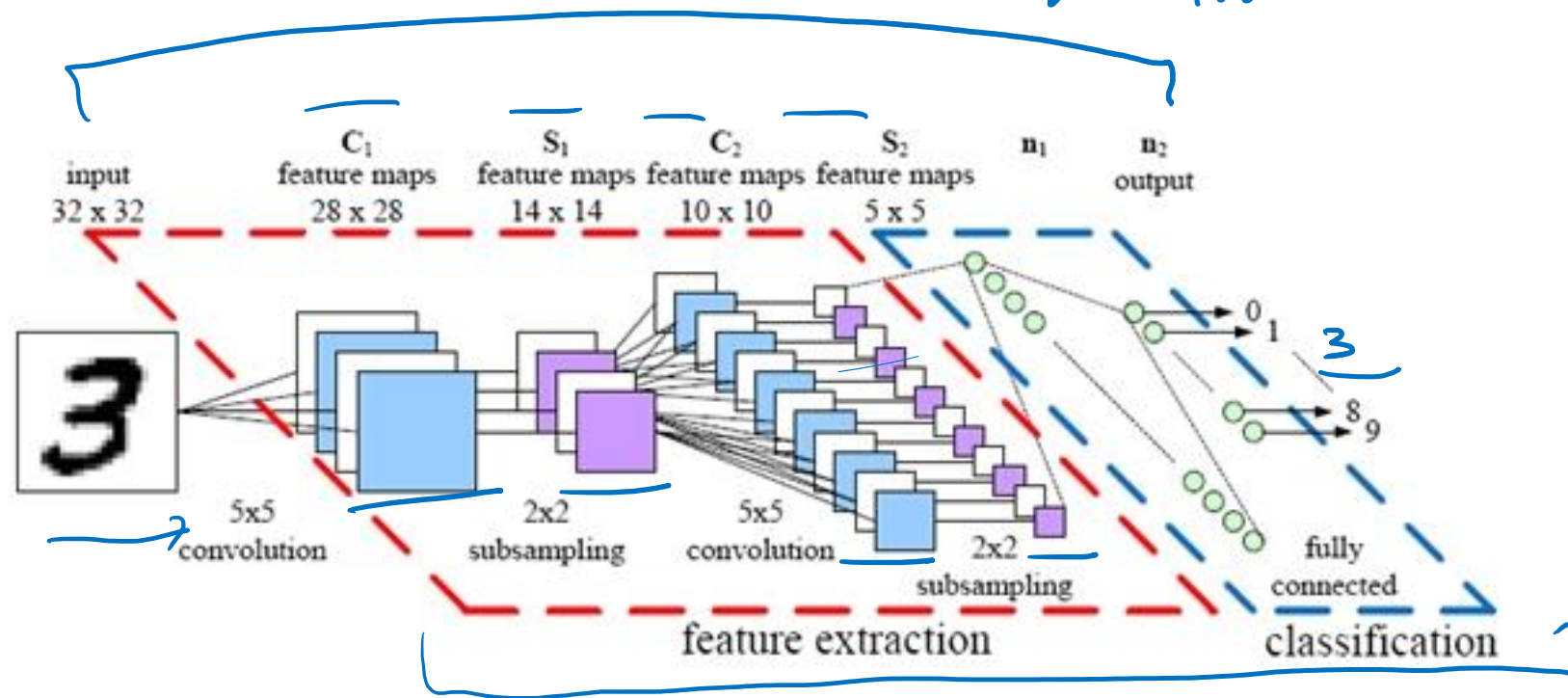
Признаки Features

1 / 5



Глубокое обучение Deep Learning

Shallow



LeNet

Imagenet

Kaggle

Supervised

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
PROJECT MAC

Artificial Intelligence Group
Vision Memo. No. 100.

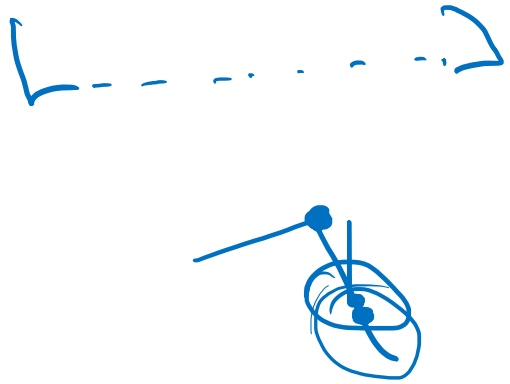
July 7, 1966

THE SUMMER VISION PROJECT

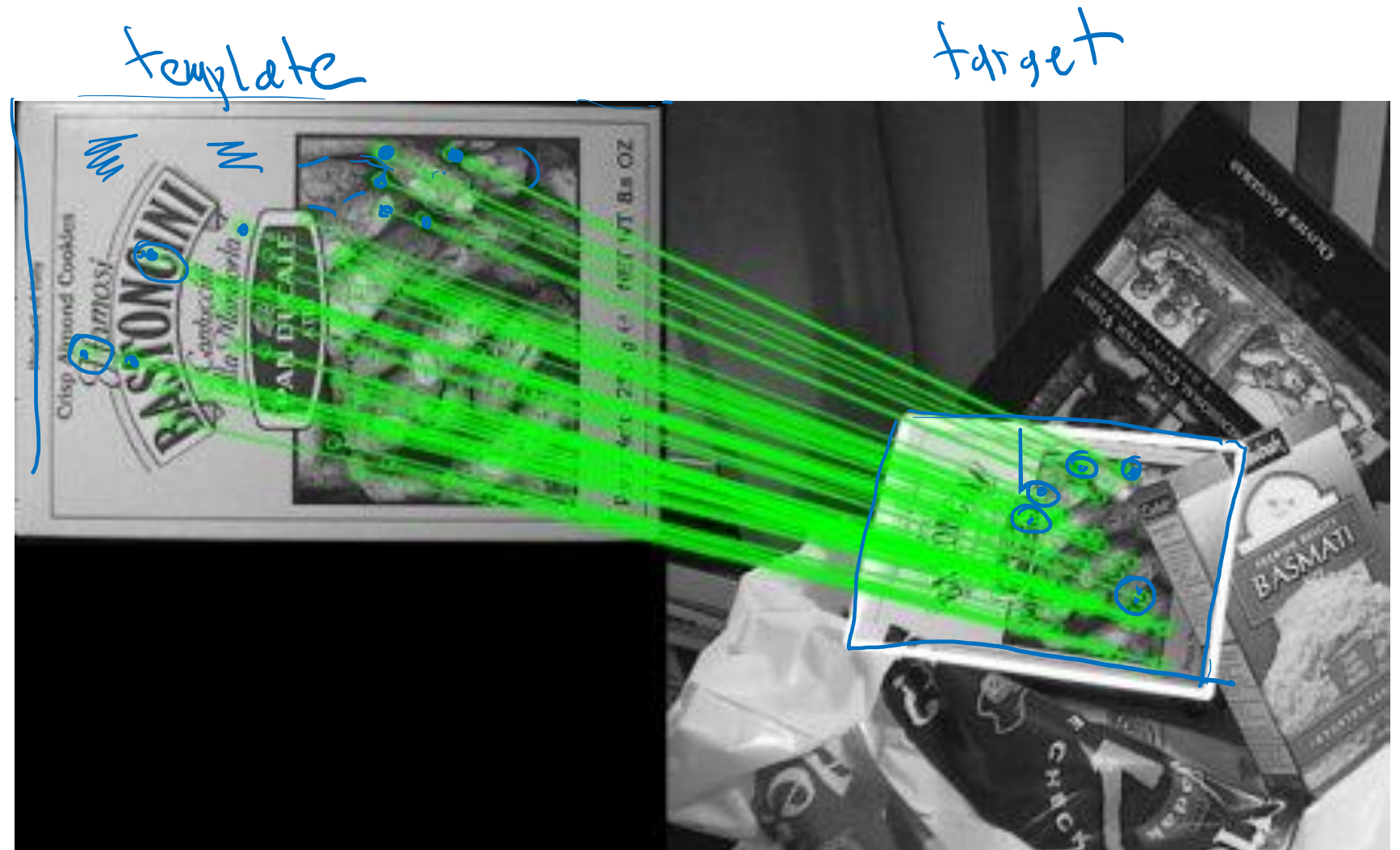
Seymour Papert

The summer vision project is an attempt to use our summer workers effectively in the construction of a significant part of a visual system. The particular task was chosen partly because it can be segmented into sub-problems which will allow individuals to work independently and yet participate in the construction of a system complex enough to be a real landmark in the development of "pattern recognition".

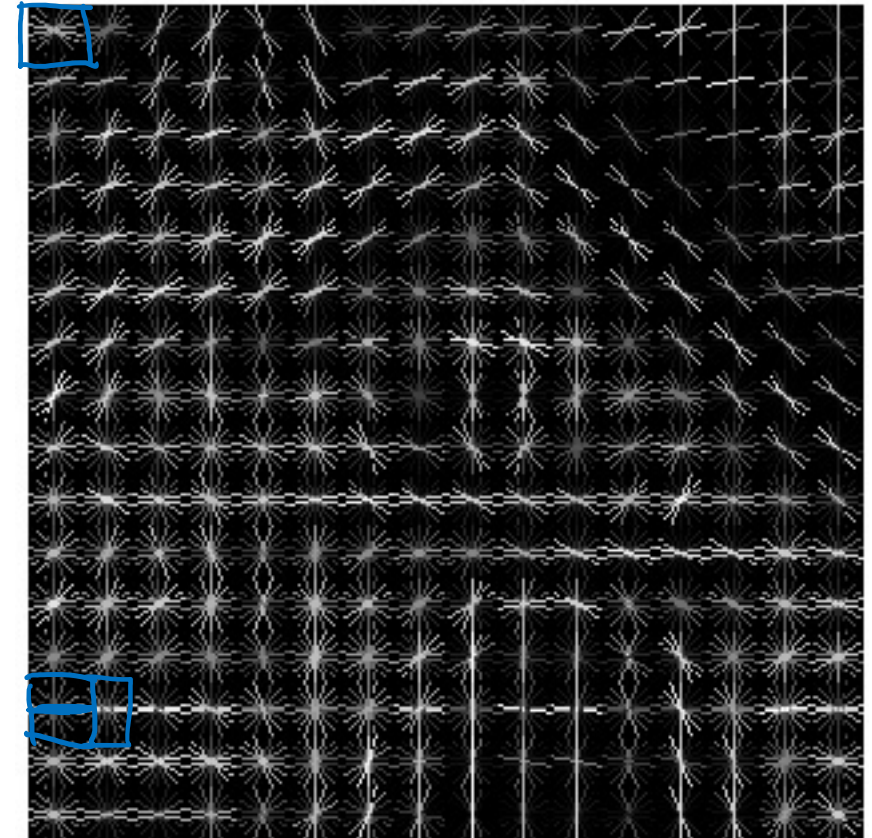
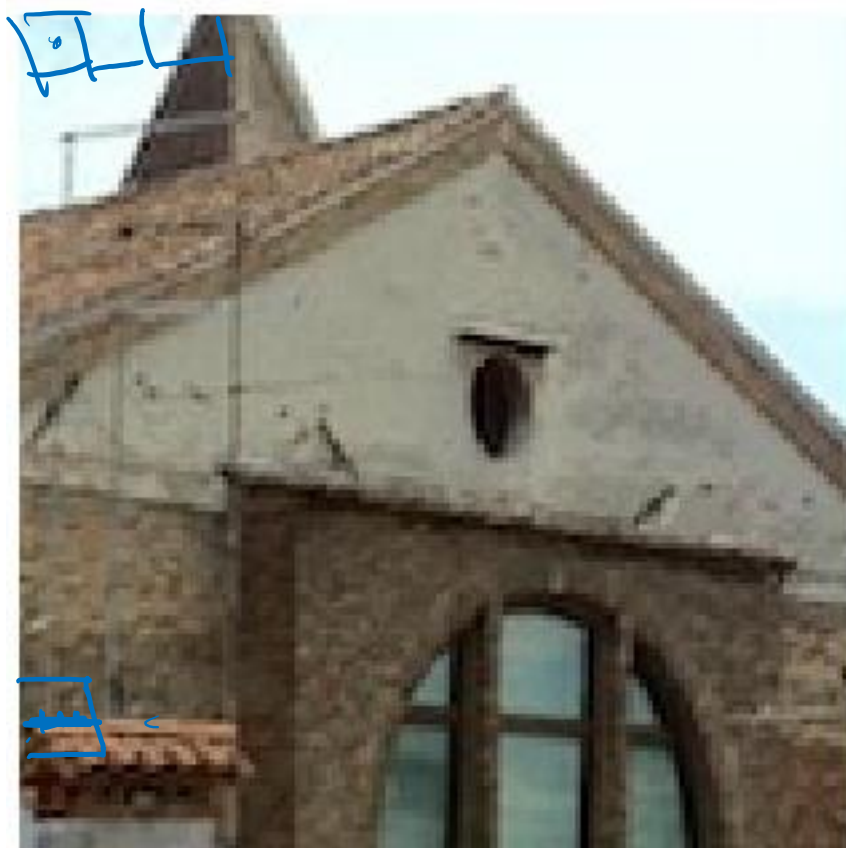
Computer vision features - SIFT



Homography

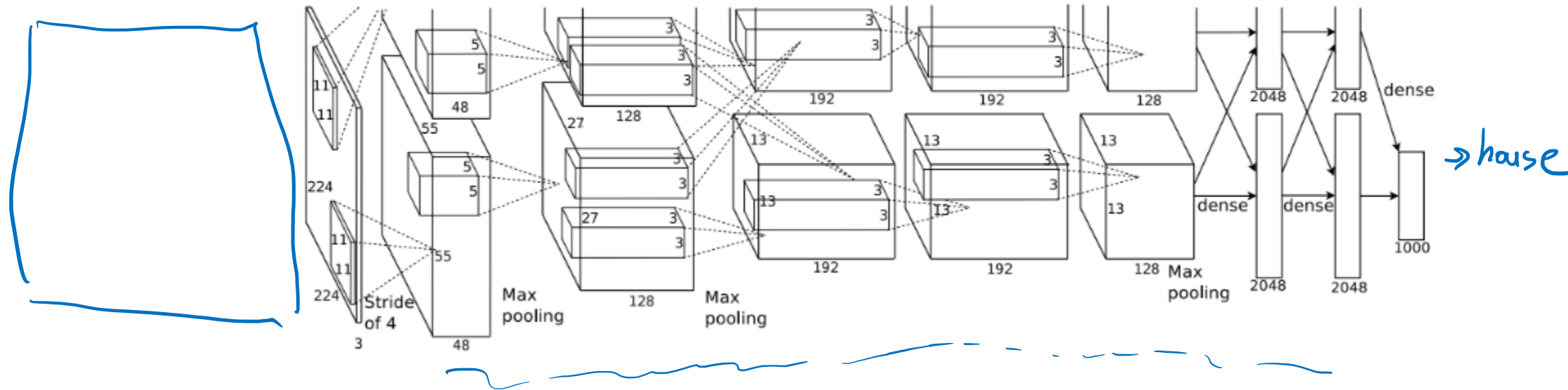


Histogram of oriented gradients HOG



Convolutional Neural Networks

AlexNet



2012

В курсе мы дойдем где-то до состояния 2014-2015 года