Institute for advanced architecture of Catalonia | BARCELONA

MASTER IN CITY & TECHNOLOGY
AI IN URBANISM
2019/2020

FACULTY DIEGO PAJARITO

AI

Setting up the cloud for AI

What is Colaboratory?

Colaboratory, or "Colab" for short, allows you to write and execute Python in your browser, with

- Zero configuration required
- Free access to GPUs
- Easy sharing

Whether you're a **student**, a **data scientist** or an **AI researcher**, Colab can make your work easier. Watch Introduction to Colab to learn more, or just get started below!

Source: https://colab.research.google.com/notebooks/intro.ipynb#
GitHub Repository: https://github.com/IaaC/MACT19.20_AI_Urbanism

```
[ ]  print("Hello World")
```

```
Hello World
```

	names	country	grades
0	Student 1	Country 1	5
1	Student 2	Country 2	5
2	Student 3	Country 3	5
3	Student 4	Country 4	5

GitHub Repository: https://github.com/IaaC/MACT19.20_AI_Urbanism

Run python code
Clone the repository
Create your own notebook
Link Colab and GitHub

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AI

Standard exercises

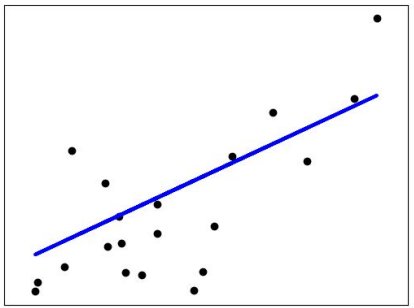
Training set of 60,000 examples, and a test set of 10,000 examples. It is a subset of a larger set available from NIST. The digits have been size-normalized and centered in a fixed-size image.

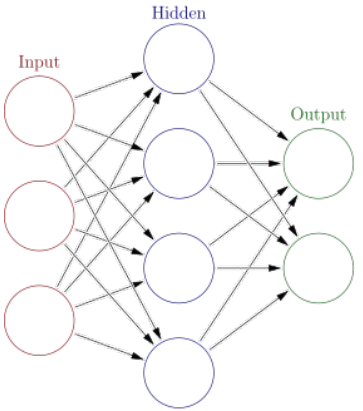
It is good database for learning techniques and pattern recognition methods on real-world data while spending minimal efforts on preprocessing and formatting.

MNIST data set: http://yann.lecun.com/exdb/mnist/

Learning Objectives:

- Train both a linear model and a neural network to classify handwritten digits from the classic MNIST data set
- Compare the performance of the linear and neural network classification models
- Visualize the weights of a neural-network hidden layer





Softmax function or softargmax or normalized exponential function

Input:
A vector of K real numbers

Output:
K probabilities proportional to the exponentials of the input numbers.

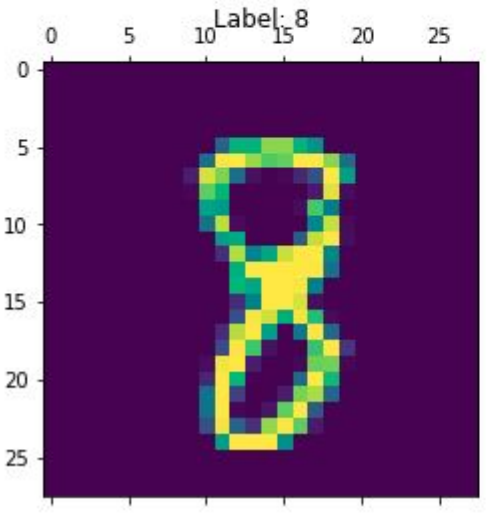
Each component will be in the interval (0,1). The components will add up to 1.

{
k_1: 1%
k_2: 14%
k_3: 0%
k_4: 80%
k_5: 5%
}

Components can be interpreted as probabilities.

Gtion usin

```
[12] rand_example = np.random.choice(training_examples.index)
     _, ax = plt.subplots()
     ax.matshow(training_examples.loc[rand_example].values.reshape(28, 28))
     ax.set_title("Label: %i" % training_targets.loc[rand_example])
     ax.grid(False)
```



Play with some parameters of the linear classification model

- batch size
- learning rate
- steps

(10 to 20 min)

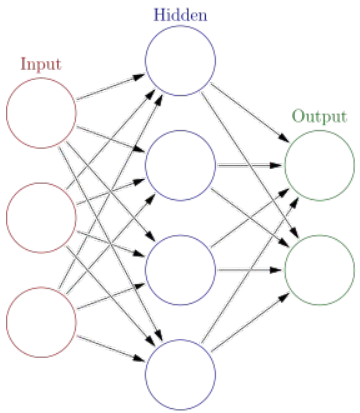
How these changes affect the model?

Elements

Neurons: activation function provides a smooth, differentiable transition as input values change

Connections and Weights: the output of one neuron as an input to another neuron

Propagation function: computes input from outputs of predecessors as a weighted sum



AI

Tensorflow

Easy model building

Build and train ML models easily using intuitive high-level APIs like Keras with eager execution, which makes for immediate model iteration and easy debugging.

Robust ML production anywhere

Easily train and deploy models in the cloud, on-prem, in the browser, or on-device no matter what language you use.

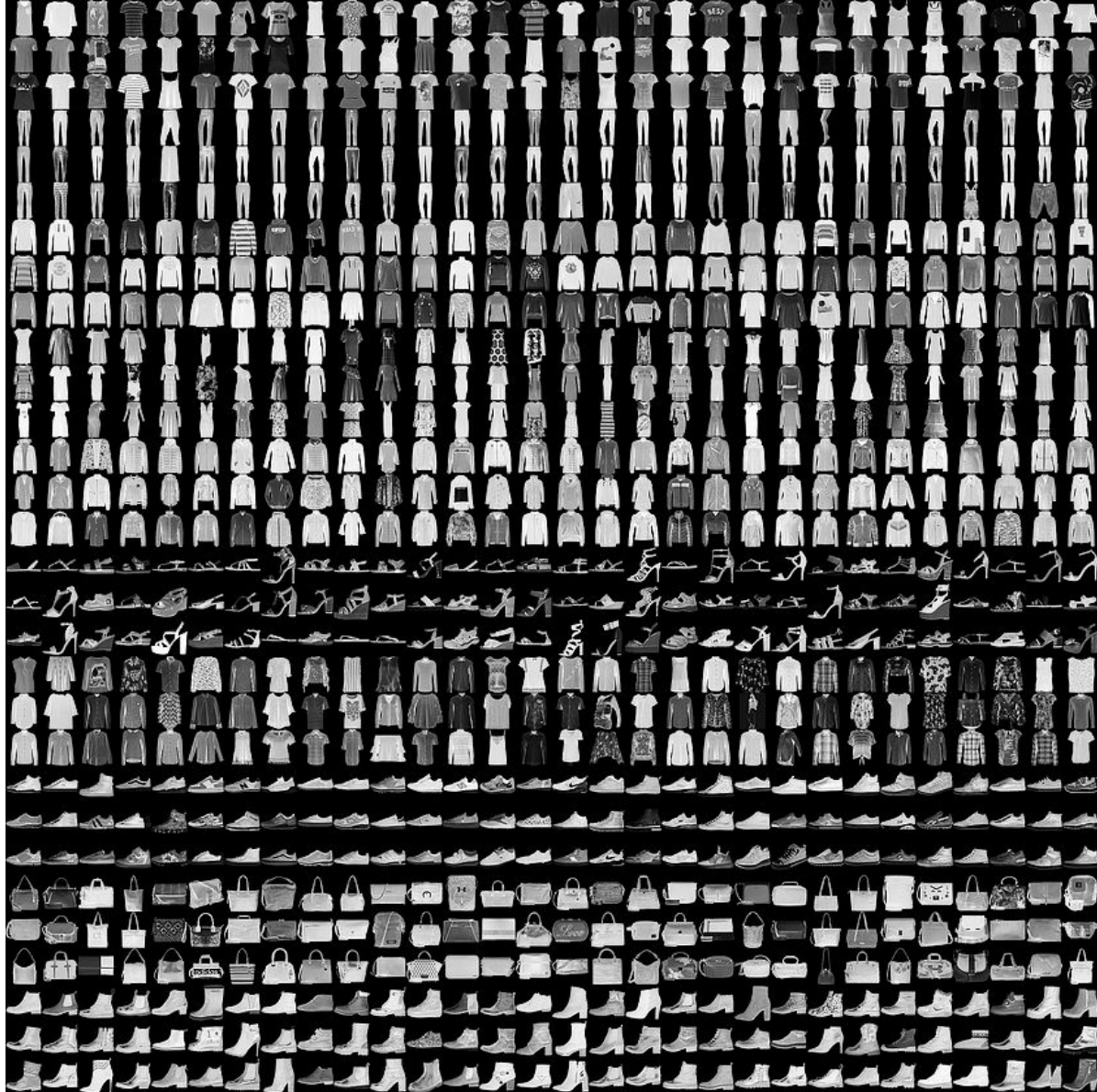
Powerful experimentation for research

A simple and flexible architecture to take new ideas from concept to code, to state-of-the-art models, and to publication faster.

The first exercise proposed in tensorflow

It trains a neural network model to classify images of clothing, like sneakers and shirts.

https://www.tensorflow.org/tutorials/keras/classification



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