

Instituto Federal de Santa Catarina  
Campus Florianópolis

# Introdução a Machine Learning

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# Inteligência Artificial

- Sistemas Especialistas
- Machine Learning
- Algoritmo Genético
- Lógica Fuzzi
- Visão Computacional
- Raciocínio Baseado em casos
- Redes Neurais (Deep learning)



## Machine Learning

O aprendizado de máquina (*Machine Learning* – ML) é um campo de estudo em ascensão, cujo principal objetivo é o desenvolvimento de algoritmos que permitem aos computadores aprender





## Machine Learning

Ainda em expansão, o aprendizado de máquina é usado para ensinar computadores a executar uma ampla variedade de tarefas úteis. Isso inclui tarefas como a **detecção automática de objetos em imagens, reconhecimento de fala, descoberta de conhecimento nas ciências médicas e análises preditivas.**



# Machine Learning

- Detecção de Fraudes
- Sistemas de Recomendação
- Mecanismos de Busca
- Sistemas de Vigilância em Vídeo
- Reconhecimento de Manuscrito
- Processamento de Linguagem Natural
- Bots de Serviço ao Cliente
- Manutenção Preditiva
- Detecção de Anomalia
- Previsão de Demanda
- Logística
- Diagnóstico de Saúde



## Machine Learning

Considerado uma subárea da Inteligência Artificial (IA), o aprendizado de máquina utiliza o **raciocínio indutivo**, metodologia que extrai regras e padrões de grandes conjuntos de dados a fim de alcançar os resultados.

Outros métodos da IA também utilizam o raciocínio dedutivo, onde o conhecimento é baseado na lógica de regras pré-definidas.

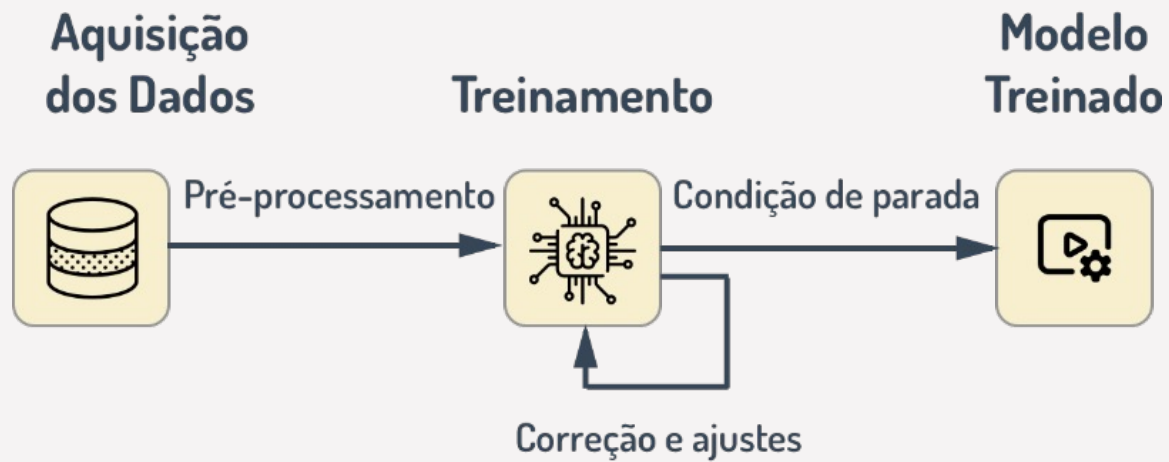


# Machine Learning

- **Inteligência Artificial (IA)**
  - Abordagem Probabilística
  - Raciocínio Dedutivo
  - Raciocínio Indutivo
    - **Machine Learning (ML)**
      - Aprendizado Não Supervisionado
      - **Aprendizado Supervisionado**



# Aprendizado Supervisionado







## Ferramentas





# Python

<https://www.python.org/>

The screenshot shows the Python.org website homepage. At the top, there is a navigation bar with links for Python, PSF, Docs, PyPI, Jobs, and Community. Below this is the Python logo and a search bar with a 'GO' button and a 'Socialize' link. A secondary navigation bar contains links for About, Downloads, Documentation, Community, Success Stories, News, and Events. The main content area features a code editor on the left with Python 3 code examples and a 'Quick & Easy to Learn' section on the right. The code examples include a simple output and an input/assignment example. The 'Quick & Easy to Learn' section highlights that Python is easy to learn for both experienced and beginner programmers. At the bottom, a large blue banner states: 'Python is a programming language that lets you work quickly and integrate systems more effectively. >>> [Learn More](#)'.

```
# Python 3: Simple output (with Unicode)
>>> print("Hello, I'm Python!")
Hello, I'm Python!

# Input, assignment
>>> name = input('What is your name?\n')
>>> print('Hi, %s.' % name)
What is your name?
Python
Hi, Python.
```

**Quick & Easy to Learn**

Experienced programmers in any other language can pick up Python very quickly, and beginners find the clean syntax and indentation structure easy to learn. [Whet your appetite](#) with our Python 3 overview.

1 2 3 4 5

Python is a programming language that lets you work quickly and integrate systems more effectively. >>> [Learn More](#)



# scikit-learning

<https://scikit-learn.org/stable/>

The screenshot shows the scikit-learn website homepage. At the top, there is a navigation bar with links for 'Install', 'User Guide', 'API', 'Examples', and 'More'. The main header features the 'scikit-learn' logo and the tagline 'Machine Learning in Python'. Below the header, there are three buttons: 'Getting Started', 'Release Highlights for 1.0', and 'GitHub'. A list of key features is displayed on the right side of the header. The main content area is divided into three columns: 'Classification', 'Regression', and 'Clustering'. Each column contains a brief description, applications, algorithms, and a representative figure.

**scikit-learn**  
*Machine Learning in Python*

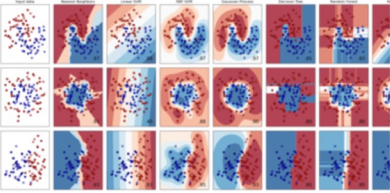
Getting Started Release Highlights for 1.0 GitHub

- Simple and efficient tools for predictive data analysis
- Accessible to everybody, and reusable in various contexts
- Built on NumPy, SciPy, and matplotlib
- Open source, commercially usable - BSD license

### Classification

Identifying which category an object belongs to.

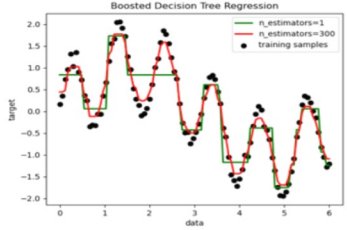
**Applications:** Spam detection, image recognition.  
**Algorithms:** SVM, nearest neighbors, random forest, and more...



### Regression

Predicting a continuous-valued attribute associated with an object.

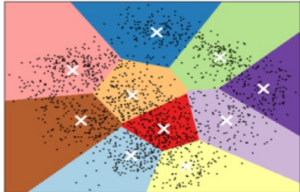
**Applications:** Drug response, Stock prices.  
**Algorithms:** SVR, nearest neighbors, random forest, and more...



### Clustering

Automatic grouping of similar objects into sets.

**Applications:** Customer segmentation, Grouping experiment outcomes  
**Algorithms:** k-Means, spectral clustering, mean-shift, and more...





# Jupyter Notebook

<https://jupyter.org/index.html>

The screenshot displays a Jupyter Notebook interface in a browser window. The browser address bar shows the URL `localhost:8888/notebooks/Jupyter%20Slides.ipynb#`. The notebook title is "Jupyter Slides" and it indicates "Last Checkpoint: 16 minutes ago (unsaved changes)". The interface includes a menu bar with "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". Below the menu is a toolbar with icons for adding, deleting, and running cells, along with a "CellToolbar" dropdown. The main content area is a slide titled "Jupyter Notebook Slides Demonstration" by Matt Speck. The slide includes an "Overview:" section stating "Jupyter Notebooks can be easily converted into slideshows for presenting code." and "Notes for presentation". A code cell (In [6]:) contains the following Python code:

```
import numpy as np
import matplotlib.pyplot as plt
X = np.random.uniform(0,50,100)
Y = np.random.uniform(0,30,100)

plt.plot(X,Y,'bo')
plt.show()
```

Below the code is a scatter plot showing 100 data points (blue circles) distributed randomly in a 2D space. The x-axis ranges from 0 to 50, and the y-axis ranges from 0 to 30.



# Anaconda

<https://www.anaconda.com/products/individual>

The screenshot shows the Anaconda Individual Edition product page. At the top, there is a navigation bar with the Anaconda logo, a 'Products' dropdown menu, and links for 'Pricing', 'Solutions', 'Resources', 'Blog', and 'Company'. A 'Get Started' button is located in the top right corner. The main content area features the Anaconda logo, the text 'Individual Edition', and the headline 'Your data science toolkit'. Below this, a paragraph describes the product as an open-source toolkit for Python/R data science and machine learning. On the right side, there is a download section for the 'Anaconda Individual Edition' for MacOS, with a 'Download' button and a file size of 440 MB. At the bottom, there is a section for 'Get Additional Installers' with icons for Windows, MacOS, and Linux.


**ANACONDA** Products ▾ Pricing Solutions ▾ Resources ▾ Blog Company ▾ [Get Started](#)

**Individual Edition**

## Your data science toolkit




With over 25 million users worldwide, the open-source Individual Edition (Distribution) is the easiest way to perform Python/R data science and machine learning on a single machine. Developed for solo practitioners, it is the toolkit that equips you to work with thousands of open-source packages and libraries.

**Anaconda Individual Edition**

[Download](#) 

For MacOS  
Python 3.8 • 64-Bit Graphical Installer • 440 MB

Get Additional Installers

 |  | 



# Instituto Federal de Santa Catarina

## Introdução a Machine Learning

# COLAB

<https://colab.research.google.com/>

The screenshot displays the Google Colaboratory (Colab) web interface. At the top, it says "Olá, este é o Colaboratory" and includes navigation links like "Arquivo", "Editar", "Ver", "Inserir", "Ambiente de execução", "Ferramentas", and "Ajuda". On the right, there are options for "Compartilhar", "Conectar", "Editar", and a user profile icon.

The left sidebar shows a navigation menu with "Índice" and several categories: "Primeiros passos", "Ciência de dados", "Machine learning", "Mais recursos", "Exemplos de machine learning", and "Seção".

The main content area is titled "Ciência de dados" and contains a text block explaining that Colab allows using Python libraries like **numpy** and **matplotlib** for data analysis. Below the text is a code cell with the following Python code:

```
import numpy as np
from matplotlib import pyplot as plt

ys = 200 + np.random.randn(100)
x = [x for x in range(len(ys))]

plt.plot(x, ys, '-')
plt.fill_between(x, ys, 195, where=(ys > 195), facecolor='g', alpha=0.6)

plt.title("Sample Visualization")
plt.show()
```

Below the code cell, the output shows a plot titled "Sample Visualization". The plot displays a line graph with a green shaded area underneath. The y-axis ranges from 195 to 203, and the x-axis represents 100 data points. The green area represents the values where  $ys > 195$ .



# Python



<https://www.python.org/>

- \* Numbers
- \* Strings
- \* Boleanos
- \* Printando

- \* Listas
- \* Dicionários
- \* Tuplas
- \* Sets

- \* Operadores de comparação
- \* if,elif, else
- \* for Loops
- \* while Loops
- \* range()
- \* list comprehension
- \* funções
- \* expressões lamda
- \* map e filter
- \* métodos



## Python



<https://numpy.org/>



<https://pandas.pydata.org/>



<https://scipy.org/>





# Python

The screenshot shows a Jupyter Notebook interface with the following content:

```
In [3]: print("Olá mundo!")
Olá mundo!
```

```
In [5]: 1+1
Out[5]: 2
```

```
In [7]: a=2
b=3
c=a+b
c
Out[7]: 5
```

```
In [8]: print(c)
5
```



# Instituto Federal de Santa Catarina

## Introdução a Machine Learning

# Python

## VS Code

The screenshot displays the Visual Studio Code interface with the Extensions Marketplace open. The main focus is on the 'Jupyter' extension by Microsoft, version 2024.1.1. The extension is currently installed, as indicated by the 'Desinstalar' (Uninstall) button. The description states: 'Jupyter notebook support, interactive programming and computing that sup...'. Below the main extension page, there is a 'Pacote de Extensões (4)' (Extension Pack (4)) section, which includes 'Jupyter Keymap', 'Jupyter Notebook Renderers', and other related extensions. The left sidebar shows a list of installed extensions, including 'isort', 'Jupyter', 'Jupyter Cell Tags', 'Jupyter Keymap', and 'Jupyter Notebook Renderers'. The bottom status bar shows 4 errors, 0 warnings, and 0 info messages.