

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.

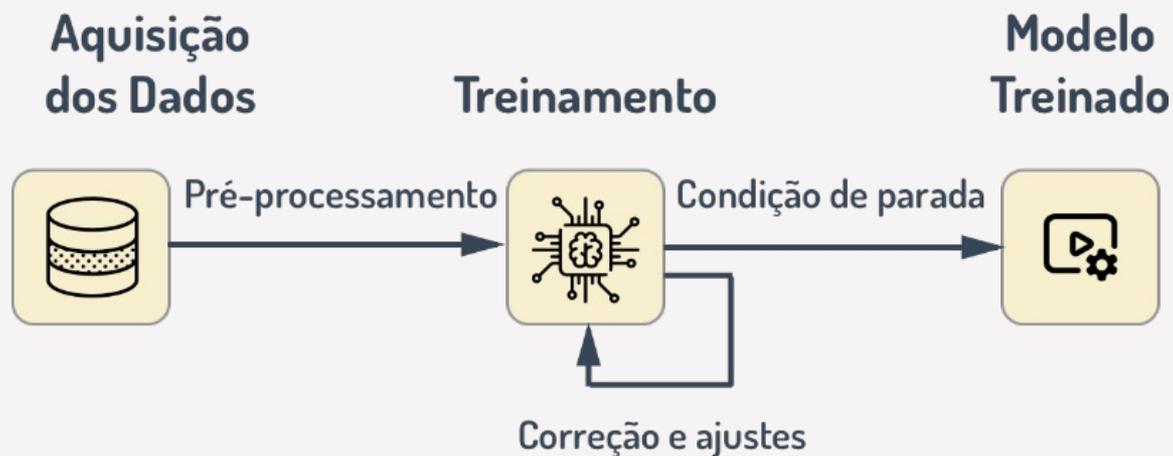


# Machine Learning

- **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 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 the scikit-learn logo and links for 'Install', 'User Guide', 'API', 'Examples', and 'More'. Below the navigation bar, the main header features the text 'scikit-learn' and 'Machine Learning in Python'. To the right of the header, there is a list of bullet points: 'Simple and efficient tools for predictive data analysis', 'Accessible to everybody, and reusable in various contexts', 'Built on NumPy, SciPy, and matplotlib', and 'Open source, commercially usable - BSD license'. Below the header, there are three buttons: 'Getting Started', 'Release Highlights for 1.0', and 'GitHub'. 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. The 'Classification' column shows a grid of 15 scatter plots. The 'Regression' column shows a line plot titled 'Boosted Decision Tree Regression' with 'data' on the x-axis and 'target' on the y-axis. The 'Clustering' column shows a scatter plot titled 'K-means clustering on the digits dataset (PCA-reduced data)' with 'Centroids are marked with white cross'.

**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 on a 2D plane with X-axis from 0 to 50 and Y-axis from 0 to 30.



# Anaconda

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

The screenshot shows the Anaconda website's product page for the Individual Edition. At the top, the Anaconda logo is on the left, and navigation links for Products, Pricing, Solutions, Resources, Blog, and Company are in the center. A 'Get Started' button is on the right. The main content area features the Anaconda logo, the text 'Individual Edition', and the headline 'Your data science toolkit'. Below this is a paragraph describing the product. On the right, there is a download button for macOS, with details about the installer (Python 3.8, 64-bit, 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

 |  | 



# COLAB

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

The screenshot displays the Google Colaboratory 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 users can leverage 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 is a line plot titled "Sample Visualization". The y-axis ranges from 195 to 203. The plot shows a blue line representing the data points, which fluctuates around a mean of 200. A green shaded area represents the region where the data points are greater than 195, with a semi-transparent fill.



# 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 Jupyter extension page open in the marketplace. The left sidebar shows the 'EXTENSÕES' (Extensions) view with a search bar and a list of installed and recommended extensions. The main area shows the details for the 'Jupyter' extension by Microsoft, version v2024.1.1. The extension is described as 'Jupyter notebook support, interactive programming and computing that sup...'. It has a rating of 4.5 stars (302 reviews) and 74,864,491 installations. The interface includes buttons for 'Desabilitar', 'Desinstalar', and 'Alternar para a Versão de Pré-Lançamento'. Below the main description, there is a 'Pacote de Extensões (4)' section listing related extensions: 'Jupyter Keymap', 'Jupyter Notebook Renderers', and 'Jupyter Cell Tags'. The 'Categorias' (Categories) section lists 'Extension Packs', 'Data Science', 'Machine Learning', 'Notebooks', and 'Visualization'. The 'Recursos de Extensão' (Extension Resources) section lists 'Mercado', 'Problemas', 'Repositório', 'Licença', and 'Microsoft'. The bottom status bar shows 4 errors, 0 warnings, and 0 info messages.