



REDES NEURAIS ARTIFICIAIS & FOSS

Estevan Luiz Junges

estevanjunges@gmail.com



INTRODUÇÃO ÀS RNAs

ARTIFICIAL
INTELLIGENCE (AI)



MACHINE
LEARNING (ML)



ARTIFICIAL NEURAL
NETWORKS (ANN)

INTELIGÊNCIA
ARTIFICIAL (IA)



APRENDIZAGEM DE
MÁQUINA



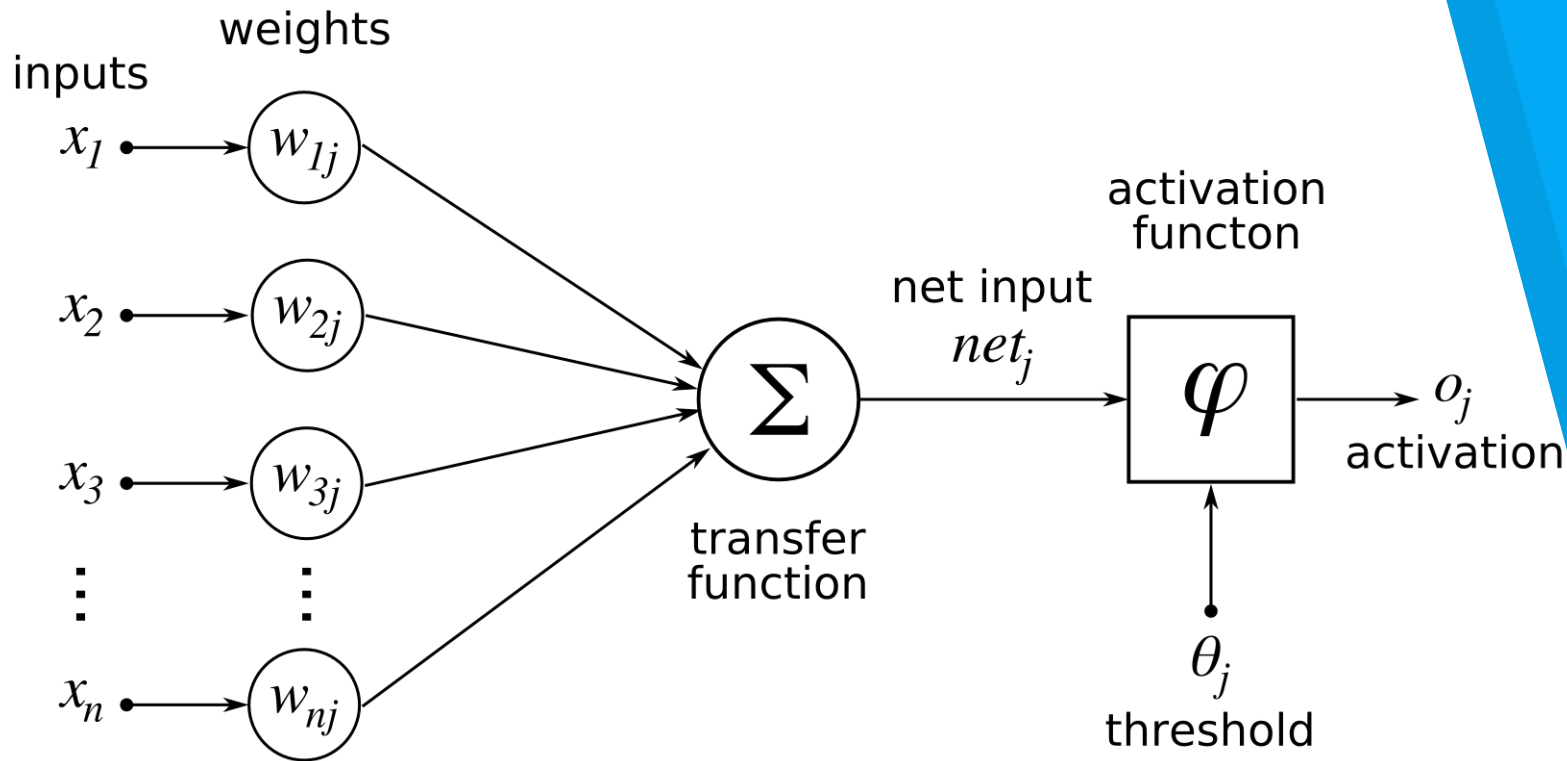
REDES NEURAIS
ARTIFICIAIS (RNA)

INTRODUÇÃO ÀS RNAs

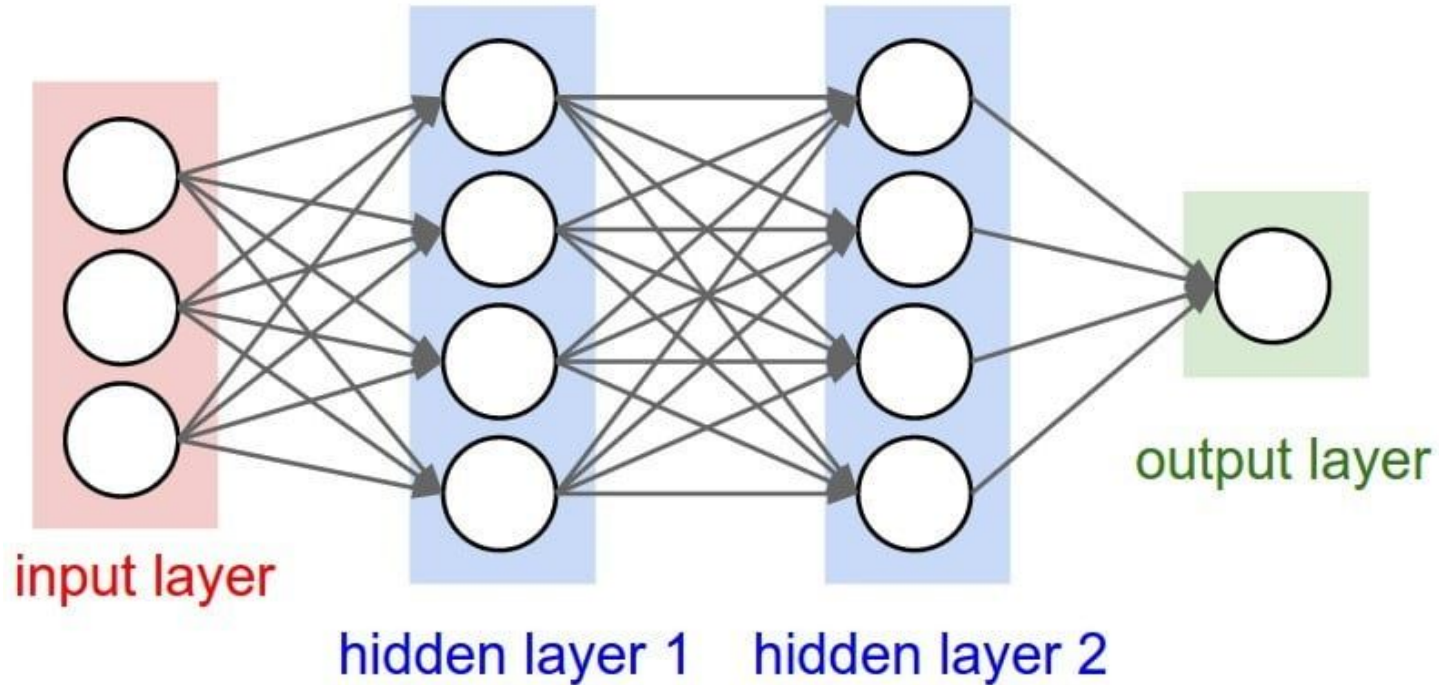
As RNAs são redes computacionais que simulam o funcionamento de redes neurais biológicas de forma **simplificada**.

É importante lembrar que o intuito não é replicar os detalhes de um sistema nervoso biológico. O objetivo é conseguir reproduzir a capacidade de **aprendizagem**.

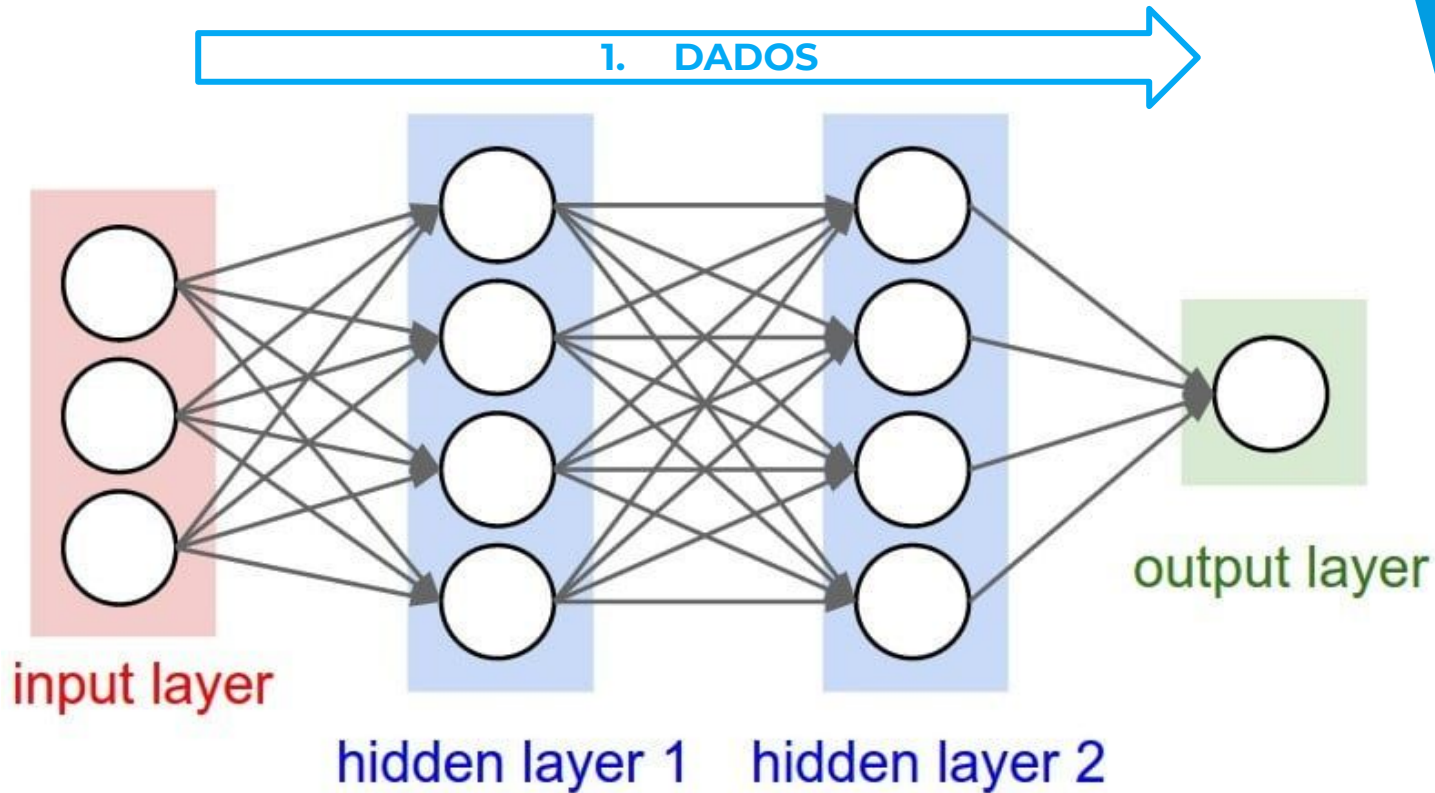
O NEURÔNIO ARTIFICIAL



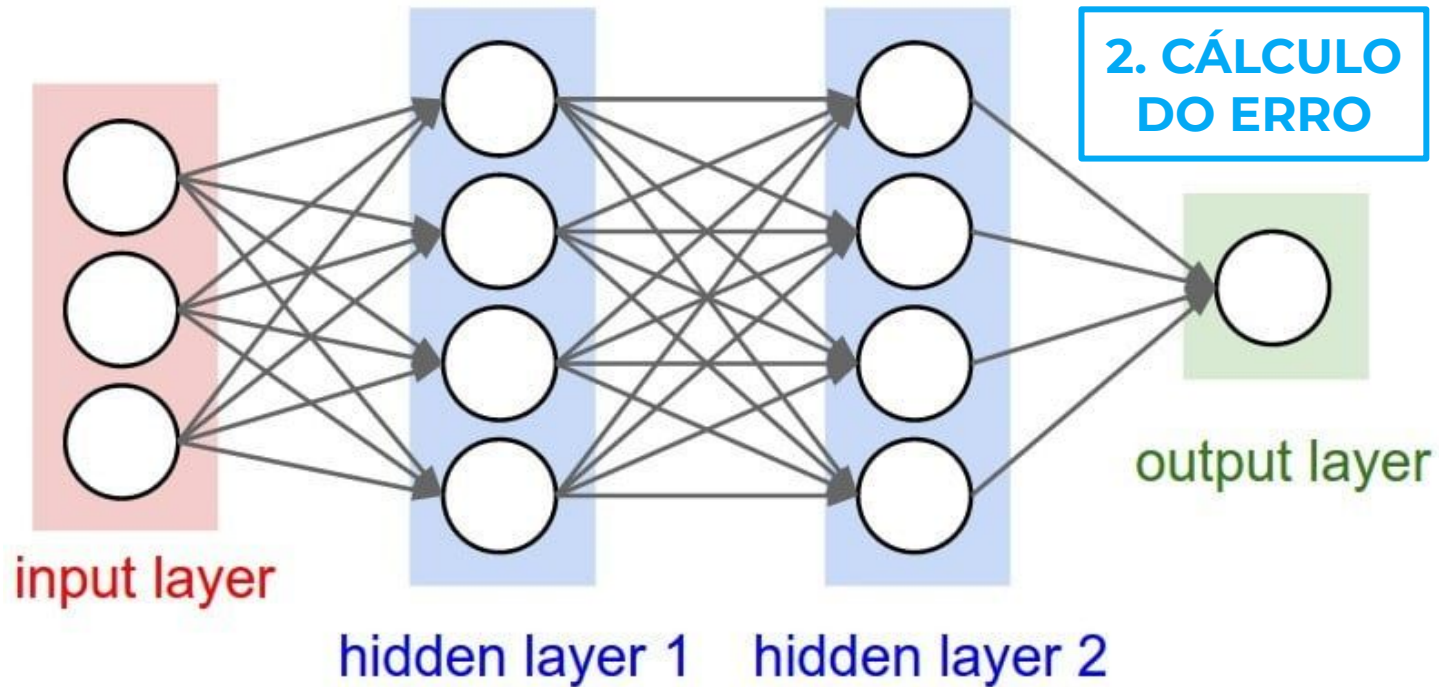
ARQUITETURAS DE RNAs



ARQUITETURAS DE RNAs

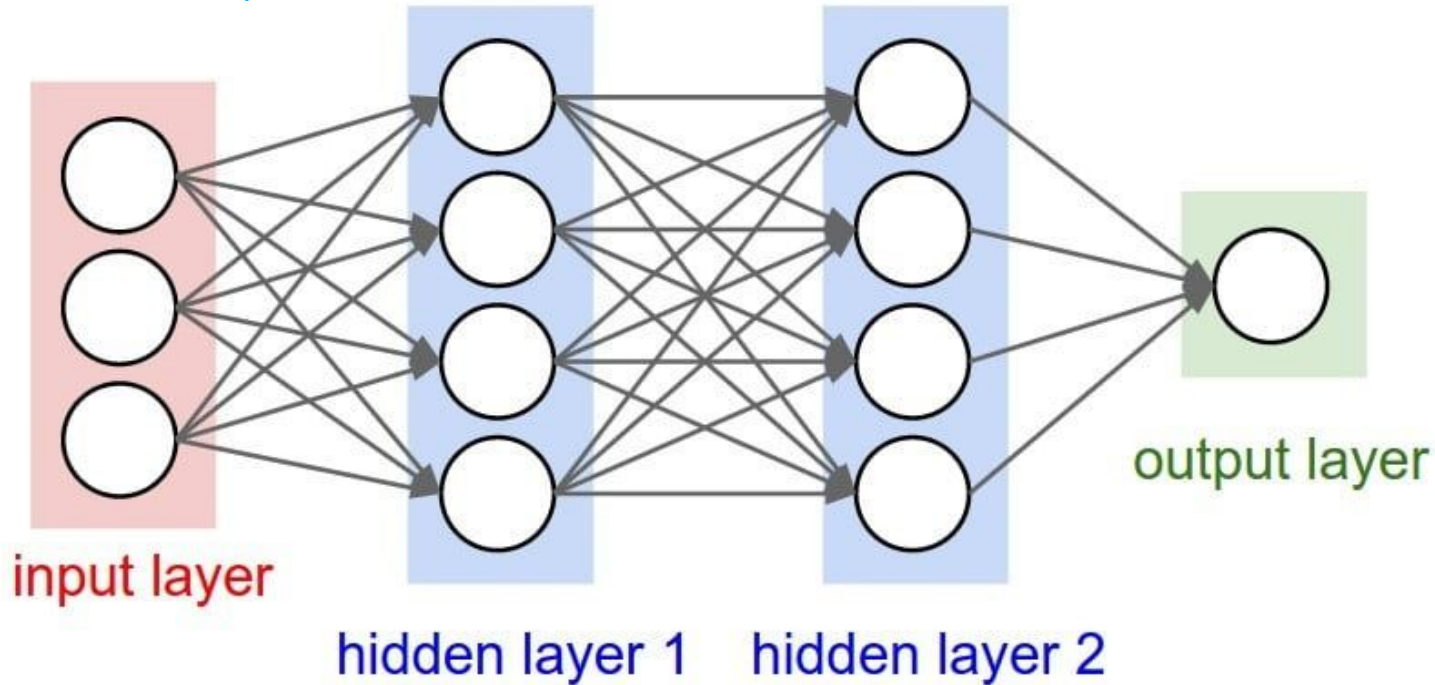


ARQUITETURAS DE RNAs



ARQUITETURAS DE RNAs

3. AJUSTE DOS PESOS





PYTHON

A LINGUAGEM PYTHON

Criada no final da década de 80 pelo programador holandês Guido van Rossum (foto).

Linguagem interpretada, com semântica dinâmica, sintaxe fácil de aprender e possui estruturas de dados de alto nível.



A LANGUAGE **PYTHON**

“The mission of the Python Software Foundation is to promote, protect, and advance the Python programming language, and to support and facilitate the growth of the international community of Python programmers.”





TENSORFLOW

TENSORFLOW

tensorflow / tensorflow

Watch 8,592 Star 126,624 Fork 74,237

Code Issues 2,108 Pull requests 370 Projects 1 Insights

An Open Source Machine Learning Framework for Everyone <https://tensorflow.org>

tensorflow machine-learning python deep-learning deep-neural-networks neural-network ml distributed

54,715 commits 30 branches 81 releases 1,967 contributors Apache-2.0

Branch: master New pull request Create new file Upload files Find File Clone or download

tensorflow-gardener Merge pull request #28286 from ROCmSoftwarePlatform:google_upstream_r... Latest commit 2092ad8 8 minutes ago

tensorflow / tensorflow

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Projects 1

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Merge pull request #28286 from ROCmSoftwarePlatform:google_upstream_r... ⋮

Latest commit 2092a18 8 minutes ago

AS **APIs** DO TENSORFLOW

High-Level
TensorFlow APIs

Estimators

Mid-Level
TensorFlow APIs

Layers

Datasets

Metrics

Low-level
TensorFlow APIs

Python

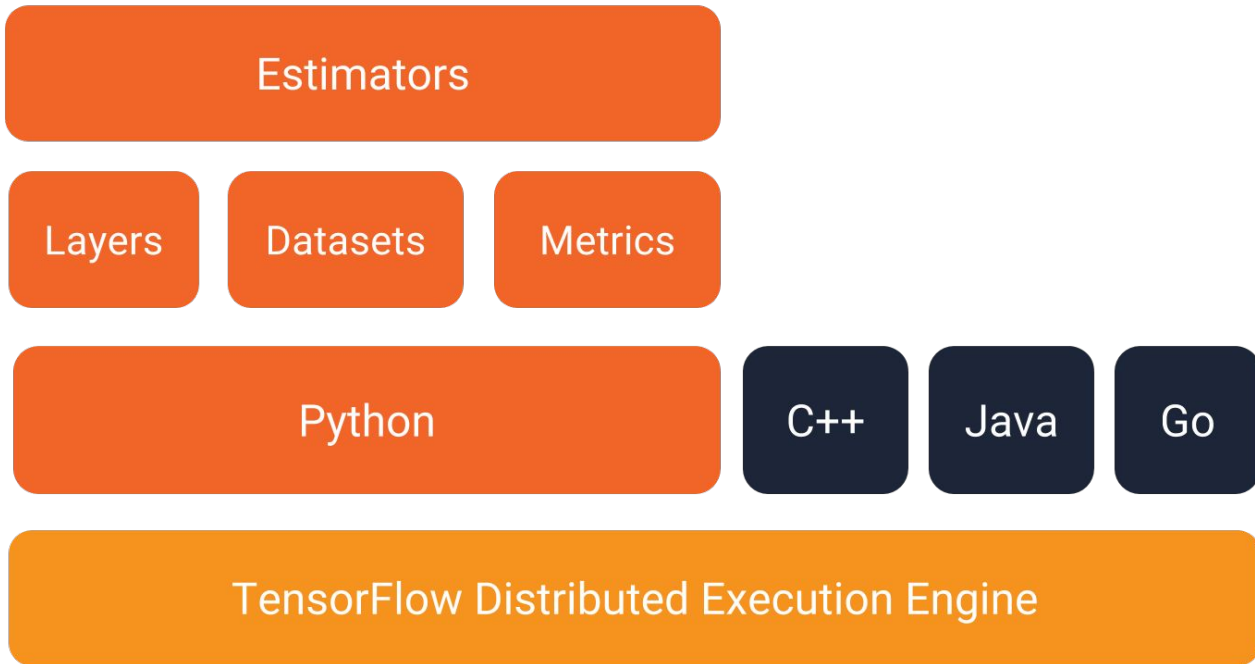
C++

Java

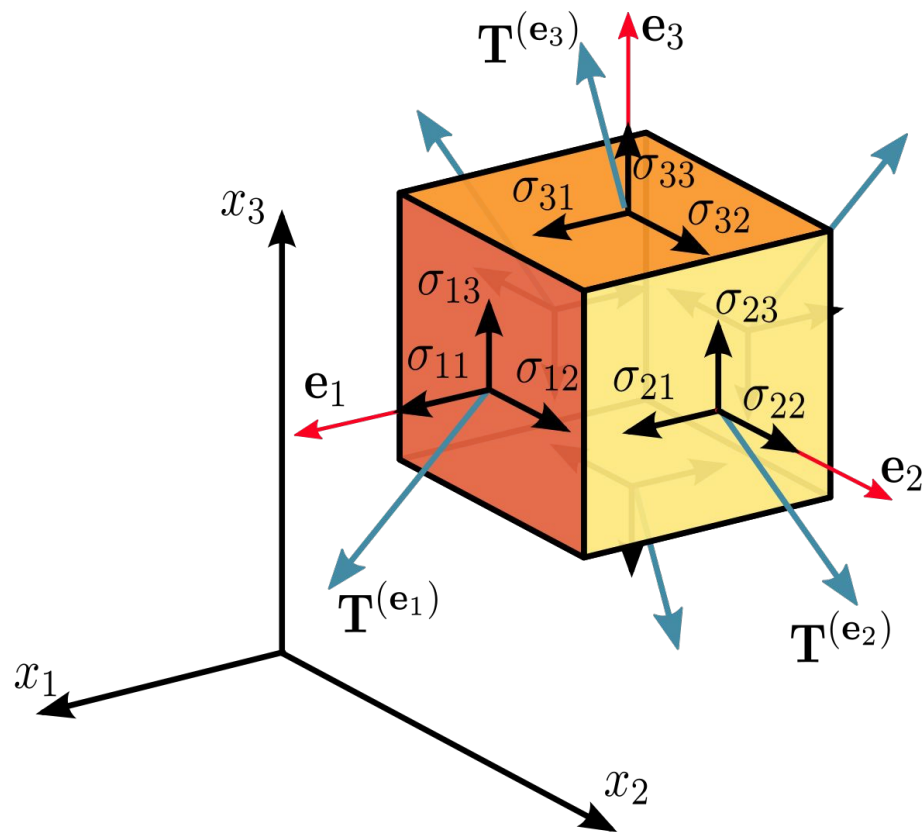
Go

TensorFlow
Kernel

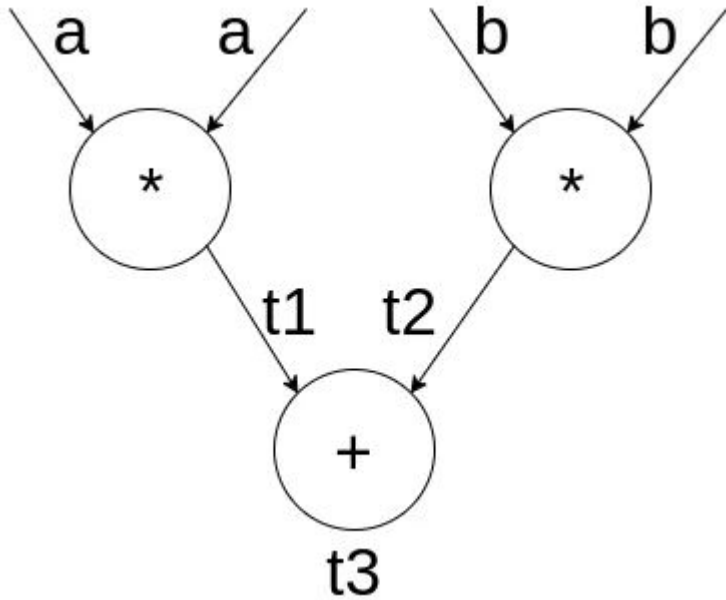
TensorFlow Distributed Execution Engine



○ TENSOR



DATA FLOW GRAPHS



$$t1 = a * a$$

$$t2 = b * b$$

$$t3 = t1 + t2$$

DATA FLOW GRAPHS

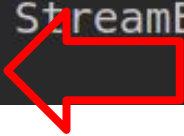
```
1  import tensorflow as tf
2
3  A = tf.placeholder(tf.int32, name='A')
4  B = tf.placeholder(tf.int32, name='B')
5
6  T1 = tf.multiply(A, A, name='T1')
7  T2 = tf.multiply(B, B, name='T2')
8
9  T3 = tf.add(T1, T2, name='T3')
10
11 with tf.Session() as sess:
12     writer = tf.summary.FileWriter('./symbolicLogs/', sess.graph)
13     output = sess.run(T3, feed_dict={A: 3, B: 4})
14     print("Resultado: {}".format(output))
```

DATA FLOW GRAPHS

```
(venv-tensorflow) estevan@notebook-estevan:~/projetos/testes/fossd
19-tensorflow$ python3 1_symbolic.py
2019-05-01 15:19:07.698671: I tensorflow/core/platform/profile_util
ls/cpu_utils.cc:94] CPU Frequency: 2195110000 Hz
2019-05-01 15:19:07.700008: I tensorflow/compiler/xla/service/serv
ice.cc:150] XLA service 0x2285670 executing computations on platfo
rm Host. Devices:
2019-05-01 15:19:07.700067: I tensorflow/compiler/xla/service/serv
ice.cc:158] StreamExecutor device (0): <undefined>, <undefined>
Resultado: 25
```

DATA FLOW GRAPHS


```
(venv-tensorflow) estevan@notebook-estevan:~/projetos/testes/fossd
19-tensorflow$ python3 1_symbolic.py
2019-05-01 15:19:07.698671: I tensorflow/core/platform/profile_util
ls/cpu_utils.cc:94] CPU Frequency: 2195110000 Hz
2019-05-01 15:19:07.700008: I tensorflow/compiler/xla/service/serv
ice.cc:150] XLA service 0x2285670 executing computations on platfo
rm Host. Devices:
2019-05-01 15:19:07.700067: I tensorflow/compiler/xla/service/serv
ice.cc:158] StreamExecutor device (0): <undefined>, <undefined>
Resultado: 25
```




DATA FLOW GRAPHS

TensorBoard **GRAPHS**

Search nodes. Regexes supported.

 Fit to Screen

 Download PNG

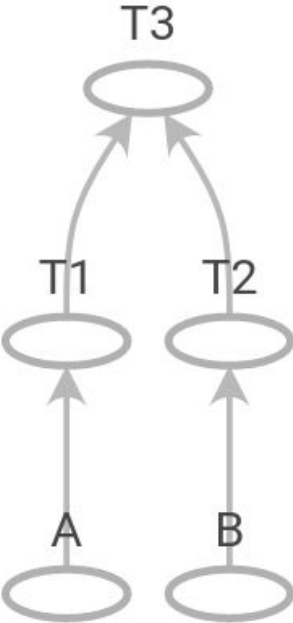
Run (1) ▾

Session runs ▾
(0)

Upload Choose File

☒ Trace inputs

Color ☒ Structure
☐ Device
☐ XLA Cluster
☐ Compute time
☐ Memory
☐ TPU Compatibility



```
graph BT; A((A)) --> T1((T1)); B((B)) --> T2((T2)); T1 --> T3((T3)); T2 --> T3
```


RECONHECIMENTO DE IMAGEM

MNIST Dataset



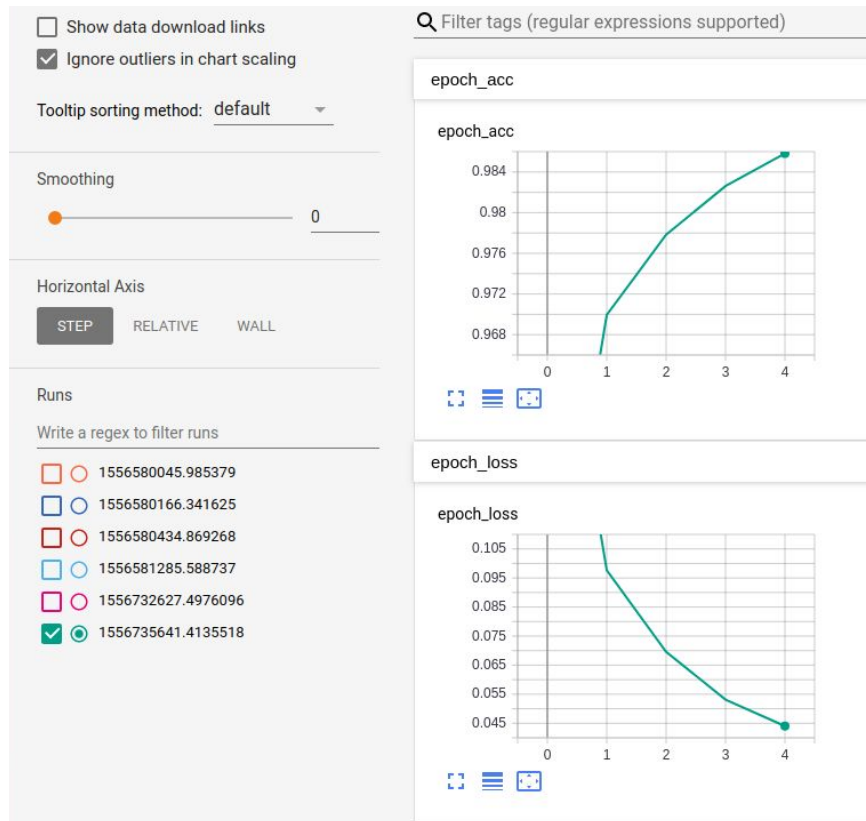
RECONHECIMENTO DE IMAGEM

```
1 import tensorflow as tf
2 from time import time
3 from tensorflow.keras.callbacks import TensorBoard
4
5 mnist = tf.keras.datasets.mnist
6
7 (x_train, y_train), (x_test, y_test) = mnist.load_data()
8 x_train, x_test = x_train / 255.0, x_test / 255.0
9
10 model = tf.keras.models.Sequential([
11     tf.keras.layers.Flatten(input_shape=(28, 28)),
12     tf.keras.layers.Dense(512, activation=tf.nn.relu),
13     tf.keras.layers.Dropout(0.2),
14     tf.keras.layers.Dense(10, activation=tf.nn.softmax)
15 ])
16 model.compile(optimizer='adam',
17               loss='sparse_categorical_crossentropy',
18               metrics=['accuracy'])
19
20 tensorboard = TensorBoard(log_dir="./logs/{}".format(time()))
21
22 model.fit(x_train, y_train, epochs=5, callbacks=[tensorboard])
23 model.evaluate(x_test, y_test)
```

RECONHECIMENTO DE IMAGEM

```
57056/60000 [=====>..] - ETA: 0s - loss:
57376/60000 [=====>..] - ETA: 0s - loss:
57696/60000 [=====>..] - ETA: 0s - loss:
58016/60000 [=====>.] - ETA: 0s - loss:
58336/60000 [=====>.] - ETA: 0s - loss:
58656/60000 [=====>.] - ETA: 0s - loss:
58976/60000 [=====>.] - ETA: 0s - loss:
59296/60000 [=====>.] - ETA: 0s - loss:
59584/60000 [=====>.] - ETA: 0s - loss:
59904/60000 [=====>.] - ETA: 0s - loss:
60000/60000 [=====] - 10s 167us/sample
e - loss: 0.0440 - acc: 0.9858
 32/10000 [.....] - ETA: 15s - loss:
1088/10000 [==>.....] - ETA: 0s - loss:
2176/10000 [=====>.....] - ETA: 0s - loss:
3232/10000 [=====>.....] - ETA: 0s - loss:
4256/10000 [=====>.....] - ETA: 0s - loss:
5312/10000 [=====>.....] - ETA: 0s - loss:
6400/10000 [=====>.....] - ETA: 0s - loss:
7488/10000 [=====>.....] - ETA: 0s - loss:
8576/10000 [=====>.....] - ETA: 0s - loss:
9632/10000 [=====>..] - ETA: 0s - loss:
10000/10000 [=====] - 1s 52us/sample
- loss: 0.0653 - acc: 0.9801
```

RECONHECIMENTO DE IMAGEM



A solid blue diagonal bar runs from the top right corner towards the bottom right corner of the slide.

kaggle

A PLATAFORMA KAGGLE

- “Rede Social” do Data Science;
- Acesso a mais de 16 mil datasets públicos;
- Você pode postar a sua análise do dataset (Kernel) e ver as análises dos outros;
- Universidades, empresas privadas e instituições governamentais organizam competições, inclusive com premiações em dinheiro.

Datasets

Documentation

New Dataset

Public

Sort by Most Votes

16,350 Datasets

Sizes





File types

Licenses

Tags

Search datasets



2958		Credit Card Fraud Detection Anonymized credit card transactions labeled as fraudulent or genuine Machine Learning Group - ULB updated a year ago (Version 3)	crime finance machine le...	CSV 66 MB ODbL	</> 2k 40 2m
1737		European Soccer Database 25k+ matches, players & teams attributes for European Professional Football Hugo Mathien updated 3 years ago (Version 10)	association... europe	SQLite 34.4 MB ODbL	</> 1k 93 604k
1577		Heart Disease UCI https://archive.ics.uci.edu/ml/datasets/Heart+Disease ronit updated 10 months ago (Version 1)	biology health classification binary clas...	CSV 3.4 KB Other	</> 443 23 277k
1515		Google Play Store Apps Web scraped data of 10k Play Store apps for analysing the Android market. Lavanya Gupta updated 3 months ago (Version 6)	video games computer s... internet mobile web	CSV 1.9 MB Other	</> 247 31 351k

Kernels

Documentation

New Kernel

Public

Your Work

Favorites

Sort by

Most Votes



Categories



Outputs



Languages



Types



Tags



Search kernels



4240



Comprehensive data exploration with Python

2mo ago in house-prices-advanced-regression-techniques [beginner](#), [eda](#), [data cleaning](#)

Py

735

3183



Introduction to Ensembling/Stacking in Python

1y ago in titanic [tutorial](#), [ensembling](#), [xgboost](#)

Py

679

3031



Stacked Regressions : Top 4% on LeaderBoard

1y ago in house-prices-advanced-regression-techniques [data cleaning](#), [regression analysis](#), [ense...](#)

Py

529

3001



Data Science Tutorial for Beginners

7mo ago in Pokemon- Weedle's Cave [tutorial](#), [beginner](#), [eda](#), [data visualization](#)

Py

797

2955



How Models Work

7d ago with multiple data sources [learn](#)

Py

2

2875



Exploring Survival on the Titanic

1y ago in titanic [0.80382](#) [tutorial](#), [beginner](#), [feature engineering](#), [random forest](#)

Rmd

933

Competitions

Documentation

InClass

General

InClass

Sort by

Grouped

All Categories

Search competitions



18 Active Competitions



TWO SIGMA

Two Sigma: Using News to Predict Stock Movements

Use news analytics to predict stock price performance

Featured · Kernels Competition · 2 months to go · news agencies, time series, finance, money

\$100,000

2,927 teams

**Jigsaw Unintended Bias in Toxicity Classification**

Detect toxicity across a diverse range of conversations

Featured · Kernels Competition · 2 months to go · biases, nlp, text data

\$65,000

1,555 teams

**LANL Earthquake Prediction**

Can you predict upcoming laboratory earthquakes?

Research · a month to go · earth sciences, physics, signal processing

\$50,000

3,491 teams

Fontes

https://code.fb.com/wp-content/uploads/2016/05/2000px-Python-logo-notext.svg_.png

<https://www.python.org/doc/essays/blurb/>

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

<https://www.datacamp.com/community/tutorials/deep-learning-python>

<https://developer.ibm.com/developer/tutorials/cc-artificial-neural-networks-neuroph-machine-learning/images/figure-1.png>

<https://avatars0.githubusercontent.com/u/15658638?s=200&v=4>

<https://blog.knoldus.com/getting-started-with-tensorflow-a-brief-introduction/>

<https://medium.com/ai-india/hello-world-tensorflow-6ce3f5bcbb6b>

https://mxnet.incubator.apache.org/versions/master/architecture/program_model.html

<https://medium.com/machine-learning-algorithms/mnist-using-recurrent-neural-network-2d070a5915a2>

<https://www.kaggle.com/datasets>

https://icdn5.digitaltrends.com/image/artificial_neural_network_1-791x388.jpg

https://upload.wikimedia.org/wikipedia/commons/6/60/ArtificialNeuronModel_english.png

https://i0.wp.com/oraculoti.com.br/wp-content/uploads/2017/02/news_20170226_pythonsoftwarefoundation.png?fit=1200%2C675&ssl=1

https://pt.wikipedia.org/wiki/Tensor#/media/File:Components_stress_tensor_cartesian.svg

OBRIGADO A TODOS!



EstevanLJ