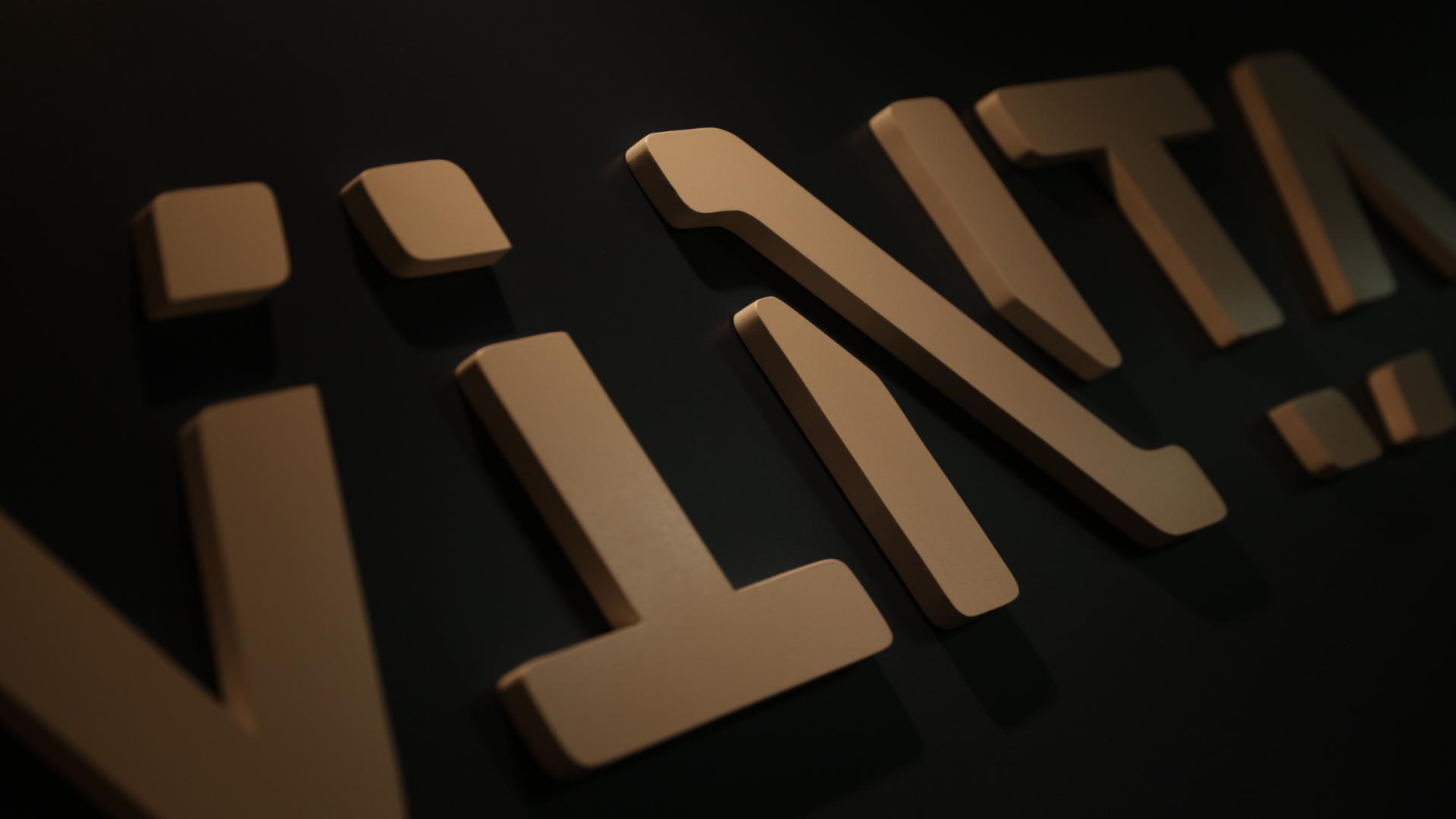


Previsão de séries temporais com pydata e redes neurais

Rebeca Sarai

- Recife
- Estudante de Engenharia da Computação - UPE/POLI
- Torcedora do ~~melhor time de Pernambuco~~ Náutico
- Organizadora do Django Girls Recife





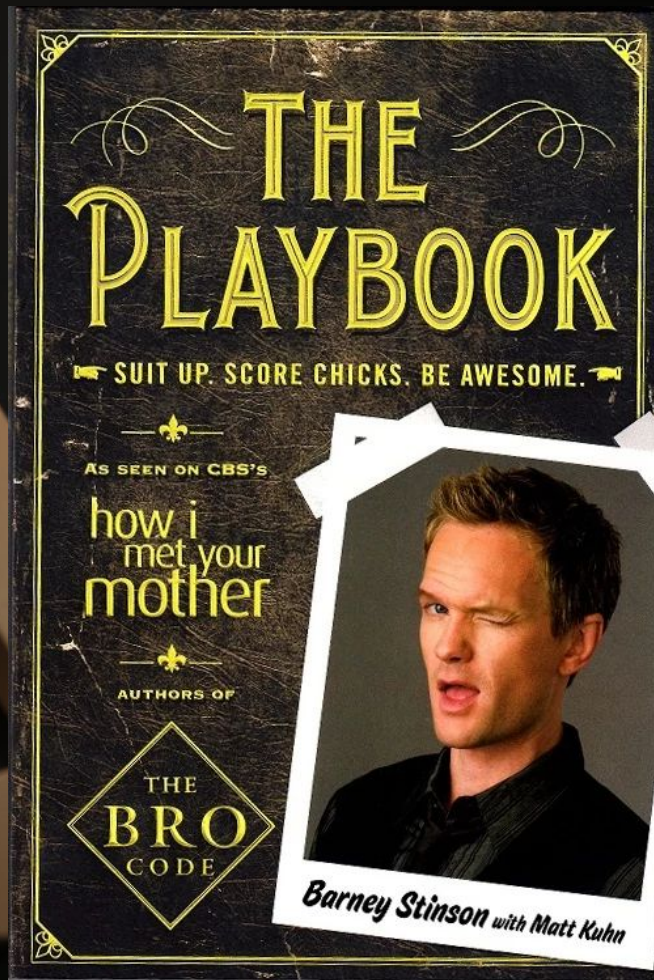


Fix my Django





Fix my Django



VINTA

HOME

BLOG

WORK

TEAM

PLAYBOOK

Vinta's Playbook

Plans and practices

CONTACT US

Playbook

Our best moves compiled

In order to achieve our goal to deliver CTO-level Django services we are constantly

VINTA

HOME

BLOG

WORK

TEAM

PLAYBOOK

Vinta's Playbook

Plans and practices

CONTACT US

Playbook

Our best moves comp

In order to achieve our goal t



antl

Séries temporels

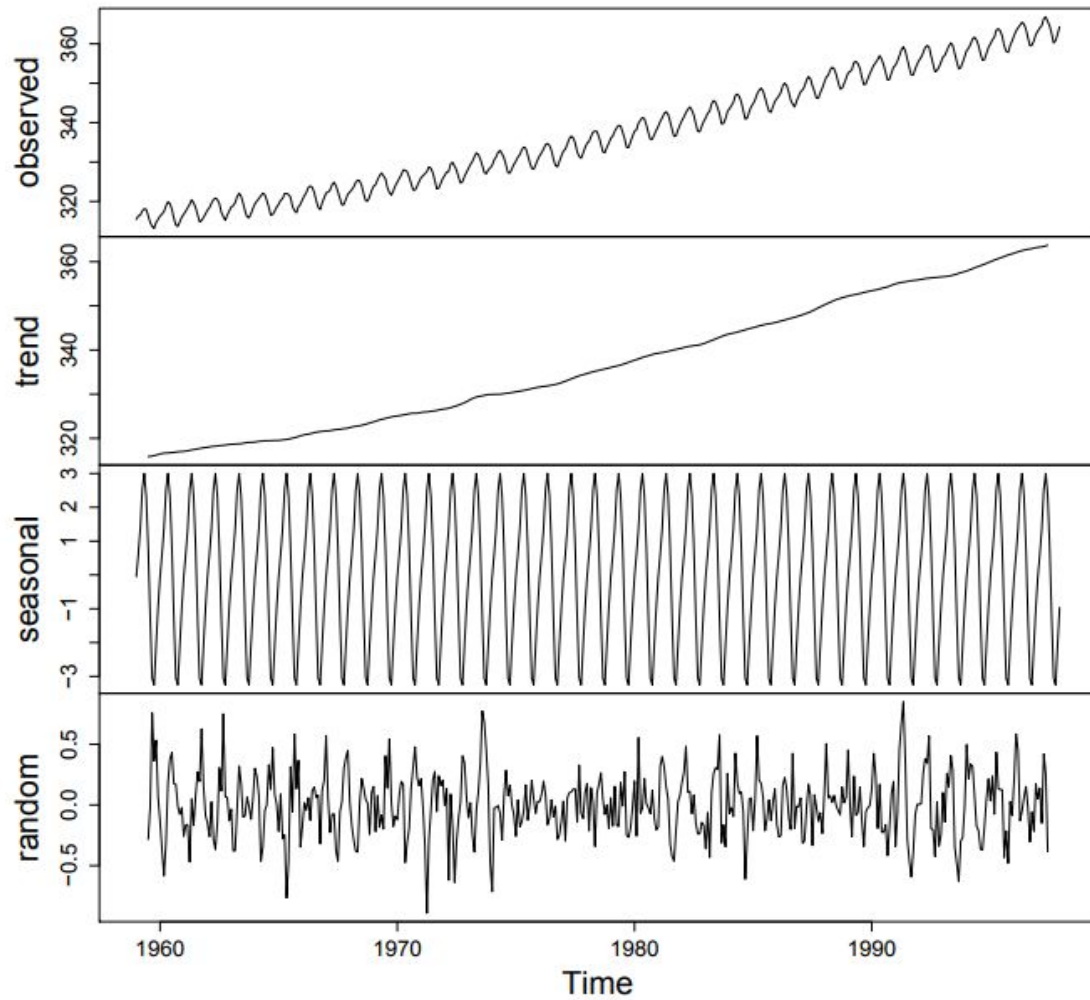
É uma **sequência** de medidas da mesma variável coletadas **ordenadamente**. Na maioria das vezes, as medições são feitas em **intervalos de tempo regulares**.

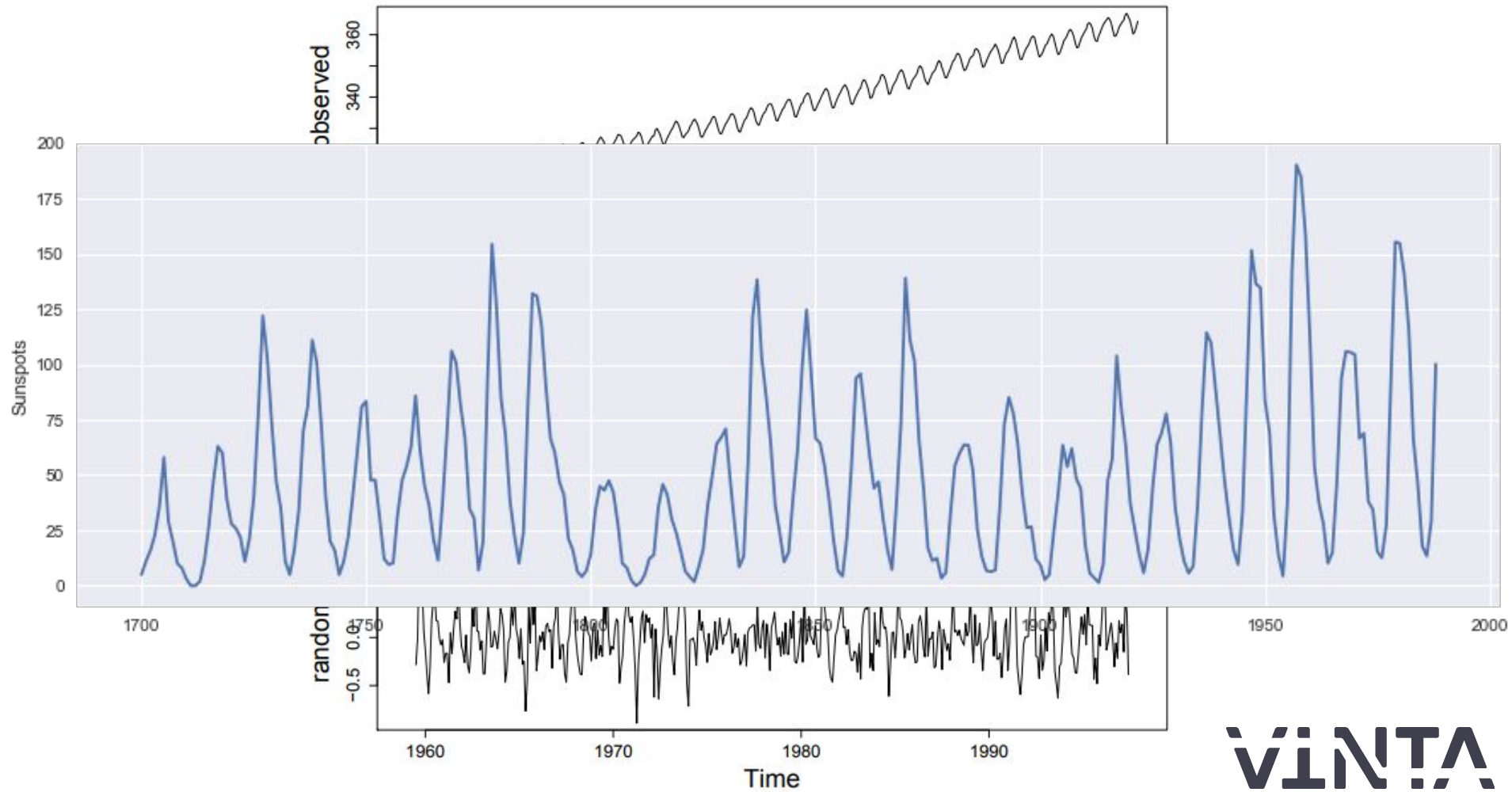
É uma **sequência**
variável coletada
maioria das ve
feitas em **int**
re



Apresentam comportamento **dinâmico**

Podem possuir: **Tendência, Ciclos,
Sazonalidade, Outlier**





Sunspots

erved

340
360

200

175

150

125

100

75

50

25

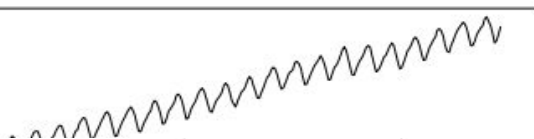
0

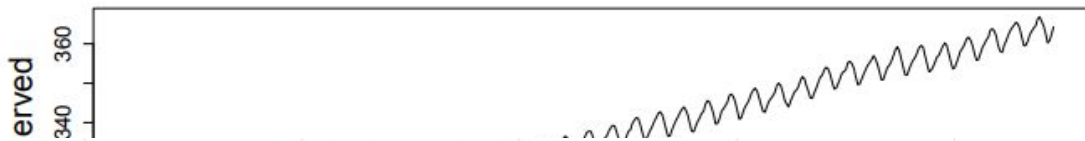
1

Bitcoin / Dollar, 240, BITFINEX

O 3962.0 H 4037.7 L 3961.9 C 4015.9

Vol (20) 981 6K





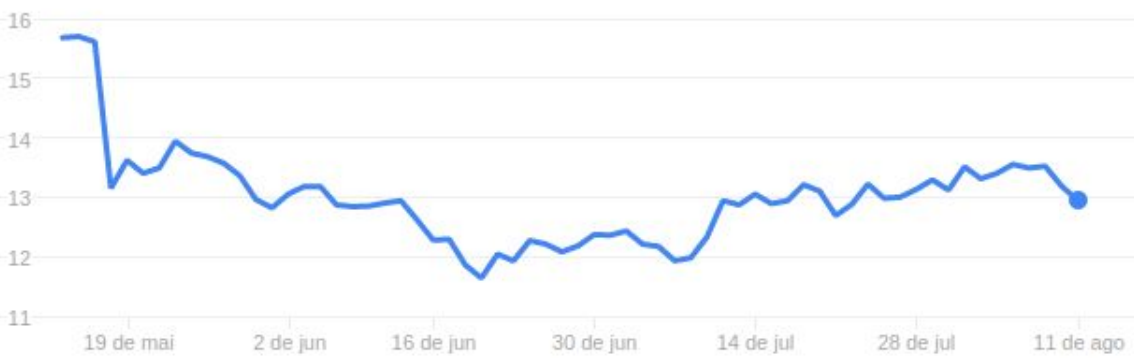
200 Bitcoin / Dollar, 240, BITFINEX O 3962.0 H 4037.7 L 3961.9 C 4015.9

Petroleo Brasileiro SA Petrobras Preference Shares

BVMF: PETR4 - 11 de ago 17:08 BRT

12,95 BRL ↓0,24 (1,82%)

Um dia Cinco dias Um mês Três meses Um ano Cinco anos máx



Abertura	13,14	Cap. merc.	178,62 bi
Alta	13,20	Pr./lucro	-
Baixa	12,94	Rend. div.	-



A análise de séries temporais tem por meta

Entender seu comportamento estatístico

Encontrar um **modelo** que se adeque ao **padrão gerador**

Explicar como o **passado** afeta o **futuro**

Qual será o preço do bitcoin?



kaggle



Competitions

Datasets

Kernels

Discussion

Jobs



Featured Dataset

Bitcoin Price Prediction

Build Model from Market Data



Team AI · last updated 2 months ago

12

Overview

Data

Kernels

Discussion

Activity

Download (38 KB)

Tags

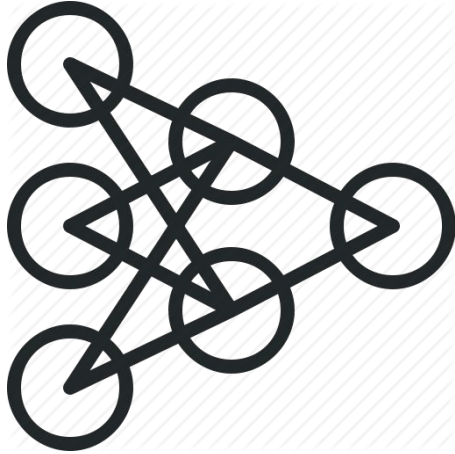
finance

time series

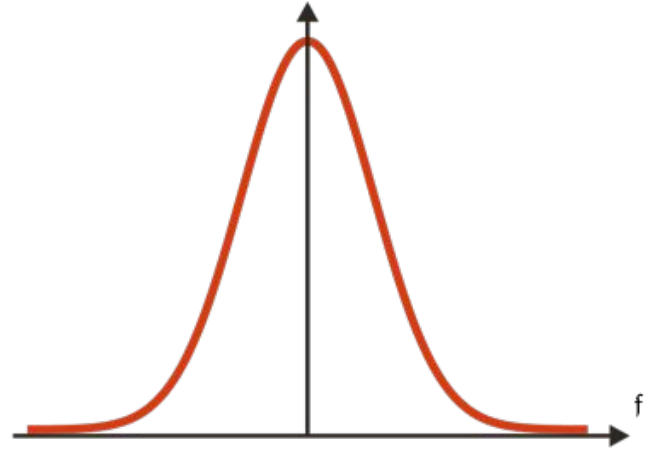
small

featured

Modelos de Previsão

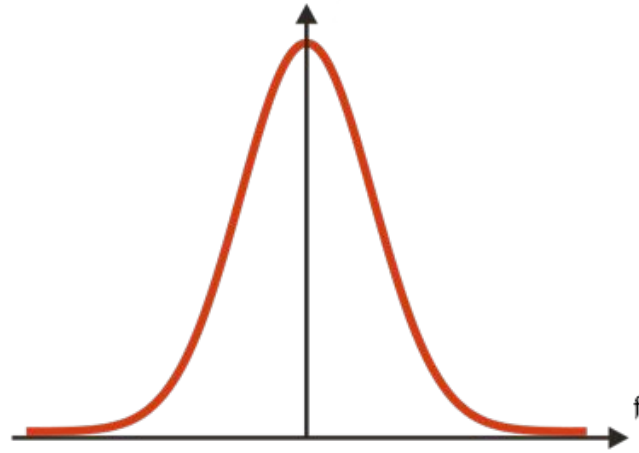


Algorítmico



Probabilístico

Modelos de Previsão



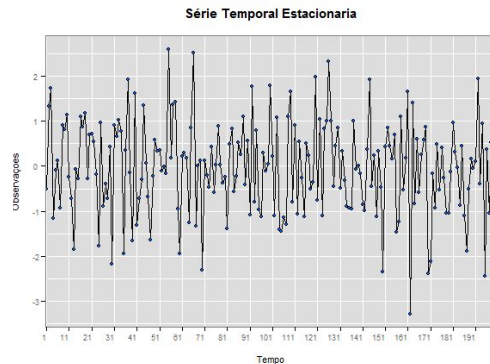
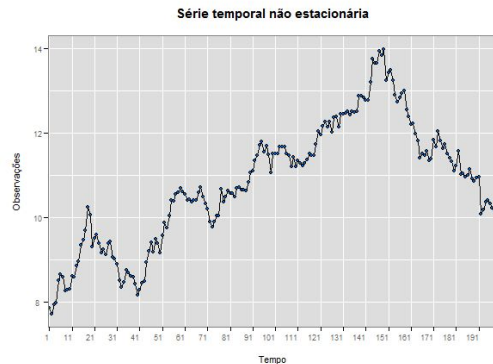
Probabilístico

ARIMA

(autoregressive integrated moving
average)

ARIMA (autoregressive integrated moving average)

- Captura a autocorrelação através de **AR** e **MA**
- Diferencia a série até ficar **estacionária**
- Lags selecionadas por critérios de informação ou validação cruzada
- Aplica inferência para obter estimativas variáveis latentes



- Modelo Auto-Regressivo (AR)

$$\hat{x}_t = \phi_1 x_{t-1} + \phi_2 x_{t-2} + \dots \phi_p x_{t-p} + a_t$$

- Modelo Médias Móveis (MA)

$$x_t = -\theta_1 a_{t-1} - \theta_2 a_{t-2} - \dots - \theta_q a_{t-q} + a_t$$

$$y_t = \sum_{i=1}^p \phi_i y_{t-i} + \sum_{j=1}^q \theta_j \epsilon_{t-j} + \epsilon_t$$

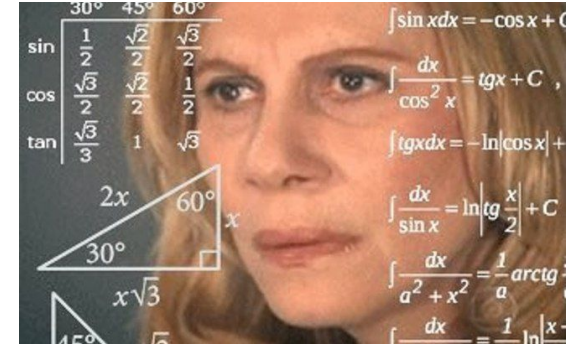
- Modelo Auto-Regressivo (AR)

$$\hat{x}_t = \phi_1 x_{t-1} + \phi_2 x_{t-2} + \dots \phi_p x_{t-p} + a_t$$

- Modelo Médias Móveis (MA)

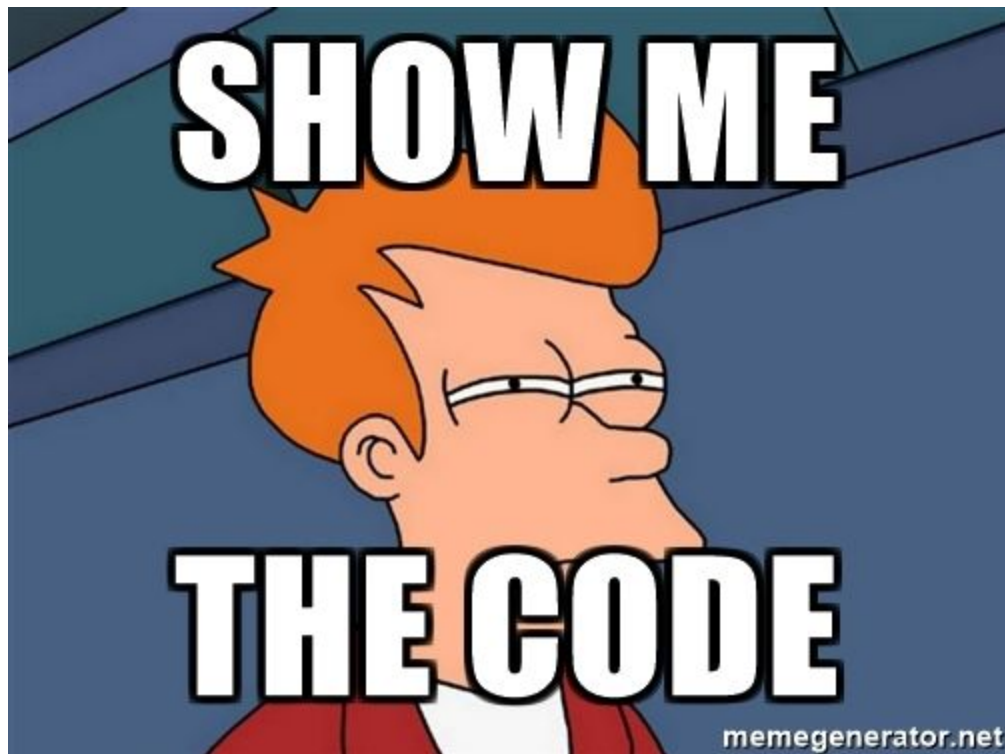
$$x_t = -\theta_1 a_{t-p} - \theta_2 a_{t-p-1} - \dots - \theta_q a_{t-p-q+1} + a_t$$

$$y_t = \sum_{i=1}^p \phi_i y_{t-i} + \sum_{j=1}^q \theta_j \epsilon_{t-j} + \epsilon_t$$



Aplicando o modelo **ARIMA**

Demo



VINTA

O que realmente aconteceu...



Limitações

- Os modelos **ARIMA** dependem de premissas lineares relativas aos dados. Devido à natureza altamente **não linear** do preço da Bitcoin, não se esperava que apresentasse um bom desempenho.
 - Bitcoin, Dólar, Real, Ações...

Em que problemas o ARIMA funciona?

Forecasting Daily Maximum Surface Ozone Concentrations in Brunei Darussalam—An ARIMA Modeling Approach

Krishan Kumar , A.K. Yadav , M.P. Singh , H. Hassan & V.K. Jain

of ARIMA(1,1,0) Model for Predicting Time Engine Crawlers

Jeeva JOSE¹, P. Sojan LAL²
ent of Computer Applications, BPC College, Piravom,
mputer Sciences, Mahatma Gandhi University, Kottay
vijojeeva@yahoo.co.in, padikkakudy@gmail.com

The Use of an Autoregressive Integrated Moving Average Model for Prediction of the Incidence of Dysentery in Jiangsu, China

Kewei Wang, PhD, Wentao Song, MPH, Jinping Li, MPH, more...

[Show all authors](#) ▾

First Published April 22, 2016 | Research Article

Application of an Autoregressive Integrated Moving Average Model for Predicting the Incidence of Hemorrhagic Fever with Renal Syndrome

[Qi Li](#),^{*} [Na-Na Guo](#), [Zhan-Ying Han](#), [Yan-Bo Zhang](#), [Shun-Xiang Qi](#), [Yong-Gang Xu](#), [Ya-Mei Wei](#), [Xu Han](#), and [Ying-Ying Liu](#)

VINTA

Outras técnicas estatísticas

- [Inferência Bayesiana](#)
- Autocorrelation Function (ACF)
- Partial Autocorrelation Function (PACF)
- Kalman Filter

Outras técnicas estatísticas

- [Inferência Bayesiana](#)
- Autocorrelation Function (ACF)
- Partial A
- Kalman



Bitcoin price prediction using Bayesian Regression

stavros0 / bitcoin-price-prediction

<> Code

Issues 1

Pull requests 0

Projects 0

panditanvita / BTCpredictor

<> Code

Issues 1

Pull requests 0

Projects 0

Wiki

Bayesian regression for latent source model and Bitcoin

Bitcoin price prediction algorithm using bayesian regression techniques

bitcoin

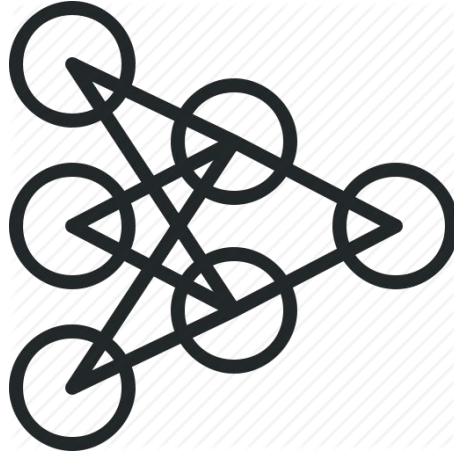
machine-learning

python

trading



Modelos de Previsão

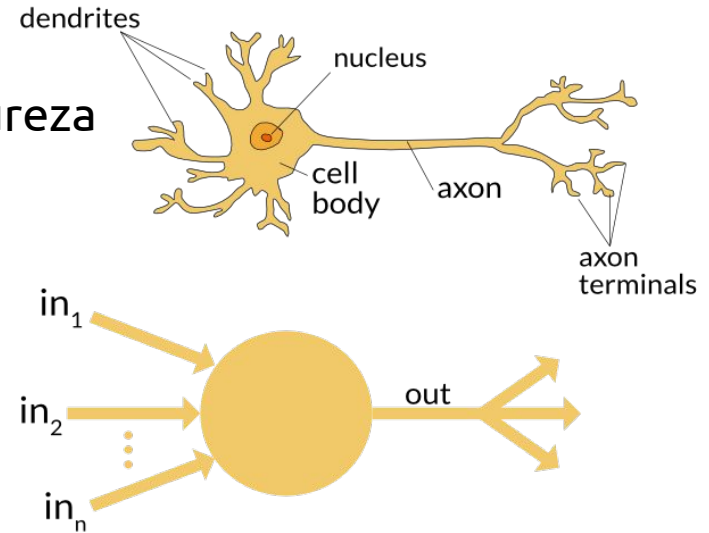


Algorítmicos

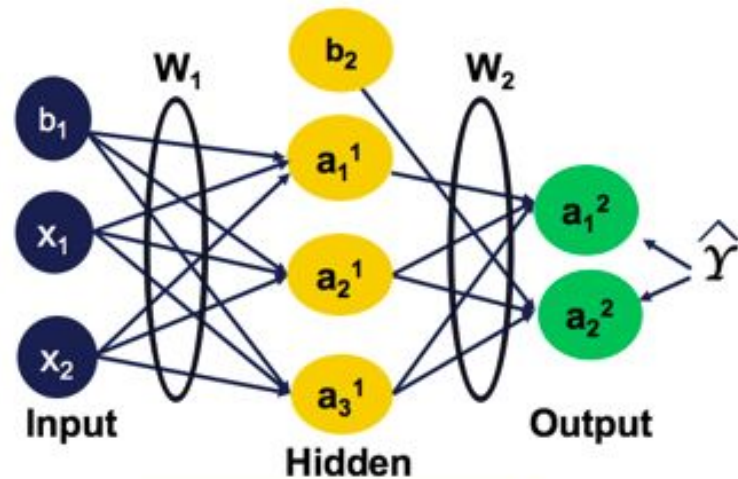
REDES NEURAIS ARTIFICIAIS

Uma estrutura composta por unidades de processamento (**neurônios artificiais**) interconectadas, tendo cada unidade de processamento uma função de ativação específica

- Inspiração biológica
- Conseguem lidar com problemas de natureza dinâmica e temporal
- Dotadas de laços de realimentação
- Modelos não lineares



- **Perceptron**
 - Tipo mais simples de rede neural, um classificador linear.
- **MLP**
 - Rede neural simples com pelo menos uma camada intermediária (oculta)
- **RBF**
 - Rede que usa funções base radiais como funções de ativação.

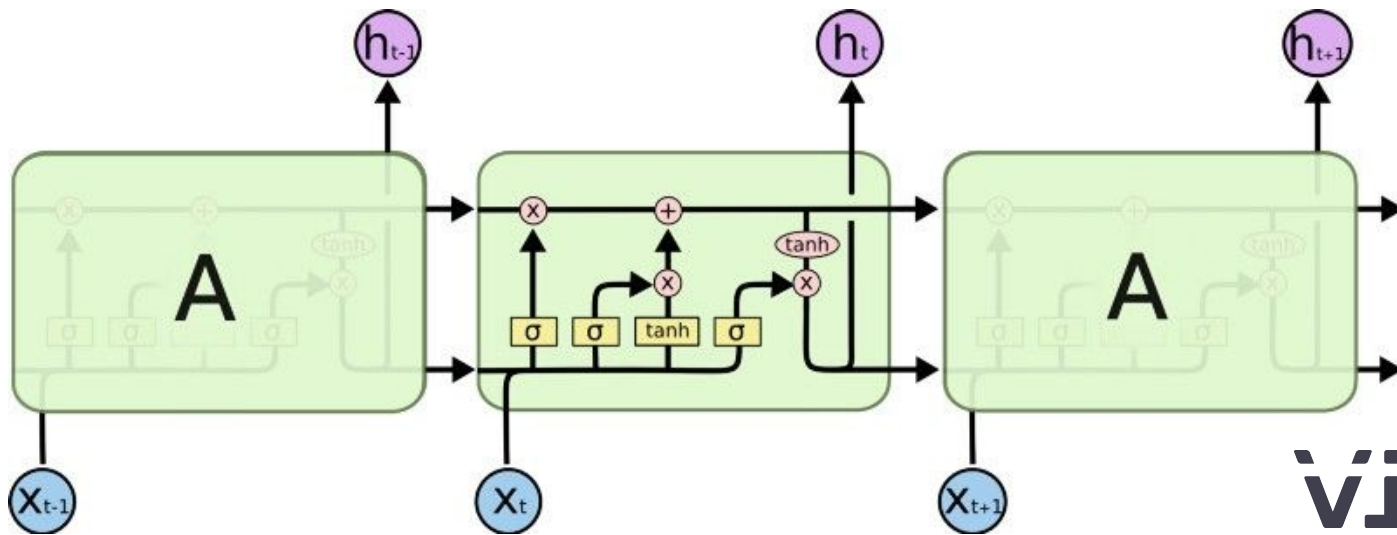


X	y
(0.71, 0.91)	1
(0.25, 0.44)	0
(0.34, 0.61)	1

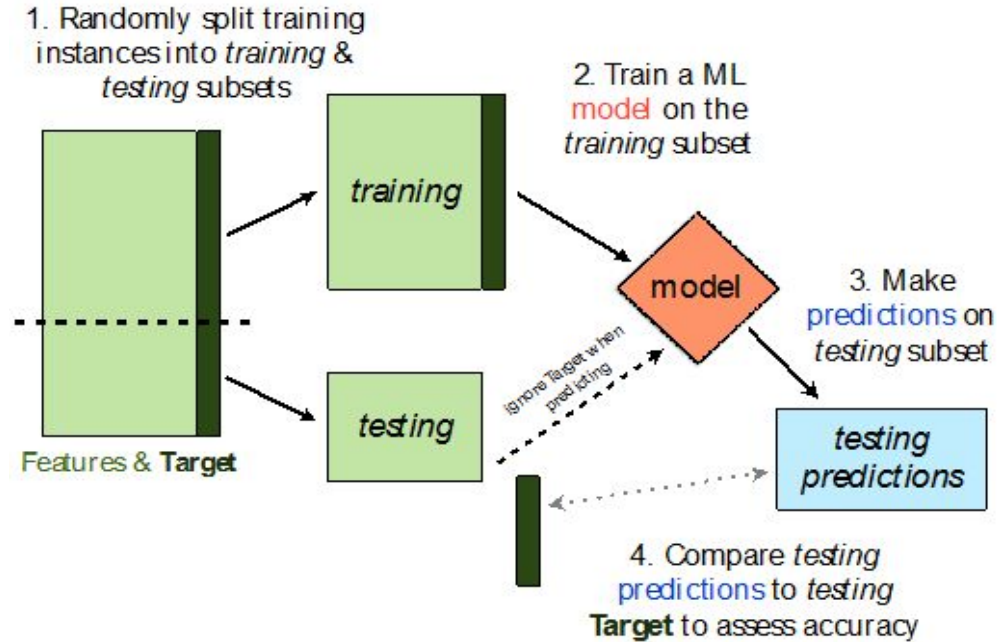
LSTM - Long Short-Term Neural Network

LSTM - Long Short-Term Neural Network

- É uma **Rede Neural Recorrente** (RNN).
- Possuem duas fontes de entrada: O **presente** e o **passado recente**.
- Possuem um **loop de feedback** conectado às suas decisões passadas.
- Estrutura dividida em **células**.



Treinamento



E isso funciona?

Neural networks for algorithmic trading. Simple time series forecasting

TOM SIMONITE BUSINESS 09.13.17 07:00 AM

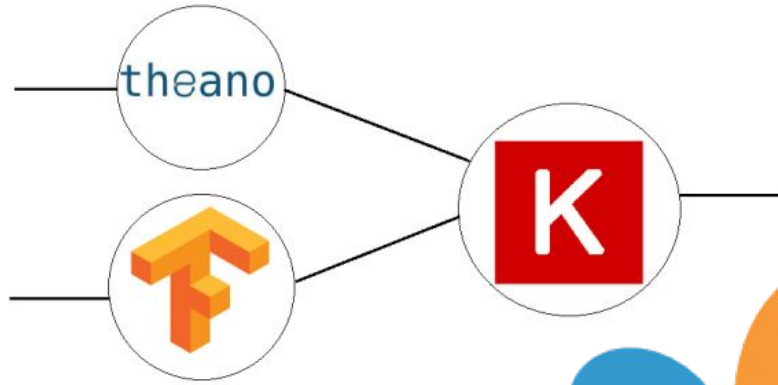
APPLE'S 'NEURAL ENGINE' INFUSES THE IPHONE WITH AI SMARTS

Using Neural Networks to Predict Multidrug-resist

OCT 02, 2017 | CONTAGION® EDITORIAL STAFF



Blocks



theano

 TensorFlow™



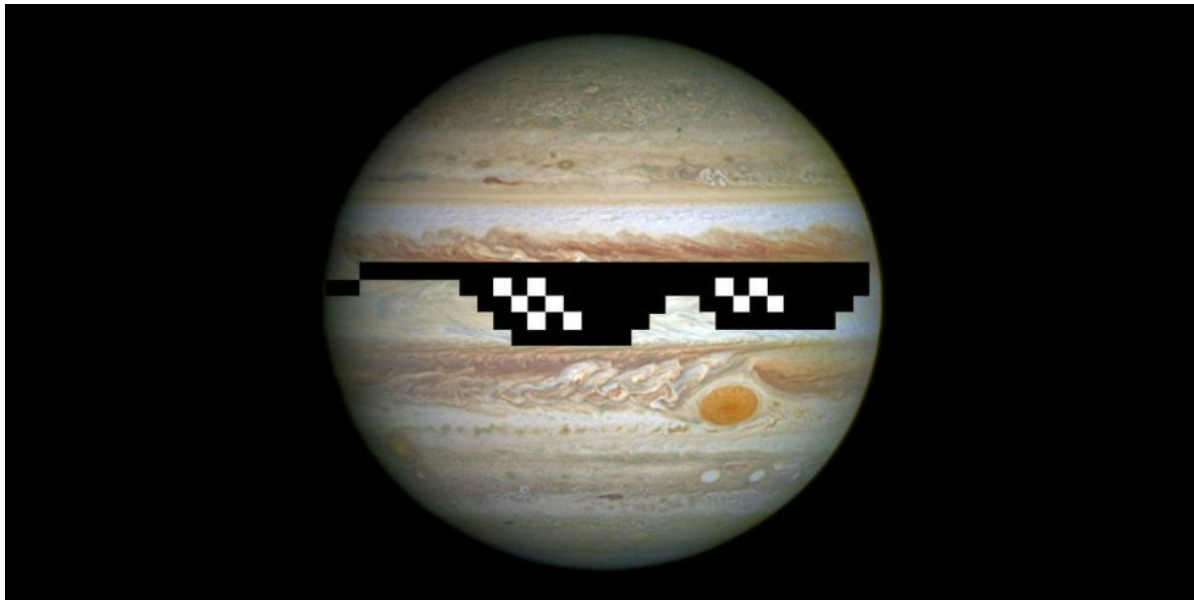
Keras

NeuPy

Neural Networks in Python

VINTA

Demo



VINTA



 PiSimo / **BitcoinForecast**

 Code

 Issues **2**

 Pull requests **0**

 Projects **0**

Predict bitcoin price with deep learning

mi

 brandonrobertz / **BitcoinTradingAlgorithmToolkit**

 Watch ▾

22

 Star

101

 Code

 Issues **0**

 Pull requests **0**

 Projects **0**

 Wiki

Insights ▾

A framework for logging, simulating, and analyzing prices of crypto currencies on various exchanges using technical analysis, fuzzy logic, and neural networks.

 cbyn / **bitpredict**

 Code

 Pull requests **0**

 Projects **0**

Insights

 Link- / **bitcoin-manalysis**

 Code

 Issues **0**

 Pull requests **0**

 Projects **0**

Bitcoin Data Analysis using Jupyter/pandas and matplotlib

Machine learning for high frequency bitcoin price prediction

VINTA



CHALLENGE ACCEPTED

Citytv

Slides:

bit.ly/vinta-pybr13
/



Twitter: <https://twitter.com/rsarai007>



Github: <https://github.com/rsarai>



Email: rebeca@vinta.com.br

Referências

- Applied Time Series Analysis
<https://onlinecourses.science.psu.edu/stat510/node/47>
- Aileen Nielsen - Time Series Analysis - PyCon 2017
<https://www.youtube.com/watch?v=zmfe2RaX-14>
- Autoregressive Integrated Moving Average ARIMA(p, d, q) Models for Time Series Analysis
<https://www.quantstart.com/articles/Autoregressive-Integrated-Moving-Average-ARIMA-p-d-q-Models-for-Time-Series-Analysis>
- Time Series Forecasting with tensor
<https://mapr.com/blog/deep-learning-tensorflow/>
- A Beginner's Guide to Recurrent Networks and LSTMs
<https://deeplearning4j.org/lstm.html>