PPgEEC
Machine Learning
Course Outline

Ivanovitch Silva
ivanovitch.silva@ufrn.br


#tenyearschallenge
@chuttersnap

PLuto

April 4, 2022
10:34:25 AM PM

1994

2002

2022


1996 - 2020
TOMB RAIDER
PS1
PS2
PS3
PS4
PS5

2010

2018

Adapted from @busarh

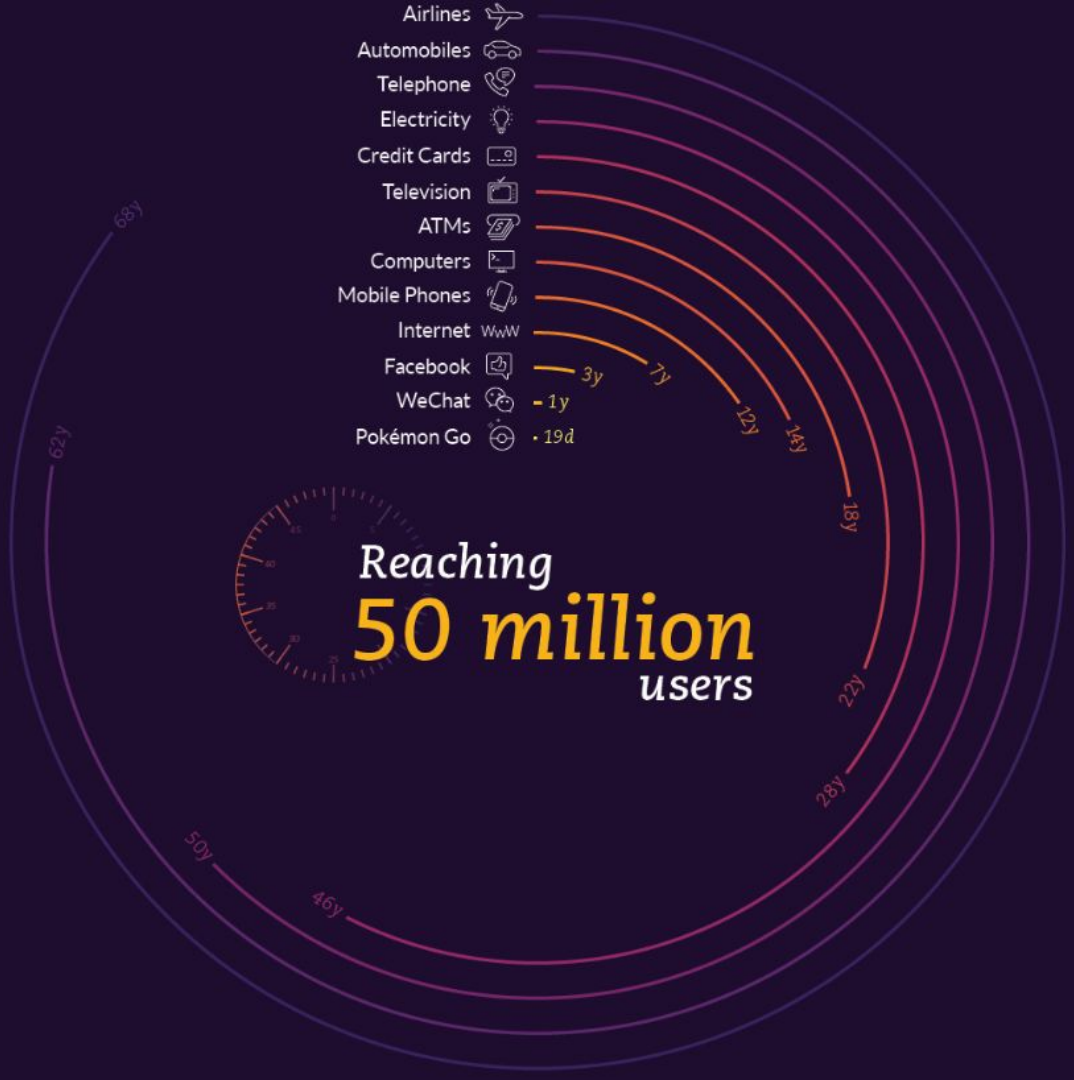
2022

2010

2022

400Mbps
R$ 99,90
2022

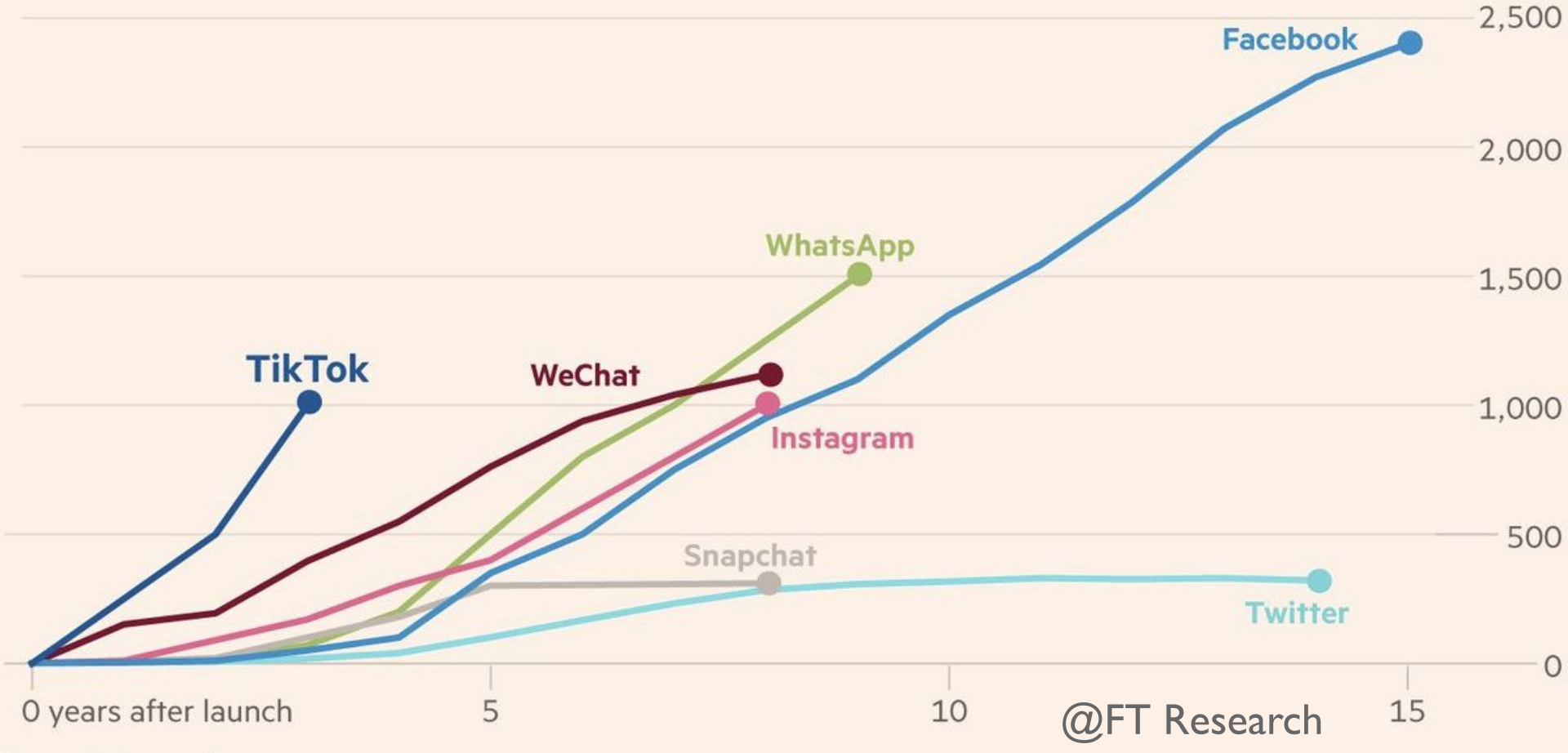
1Mbps
R$ 110,00
2010

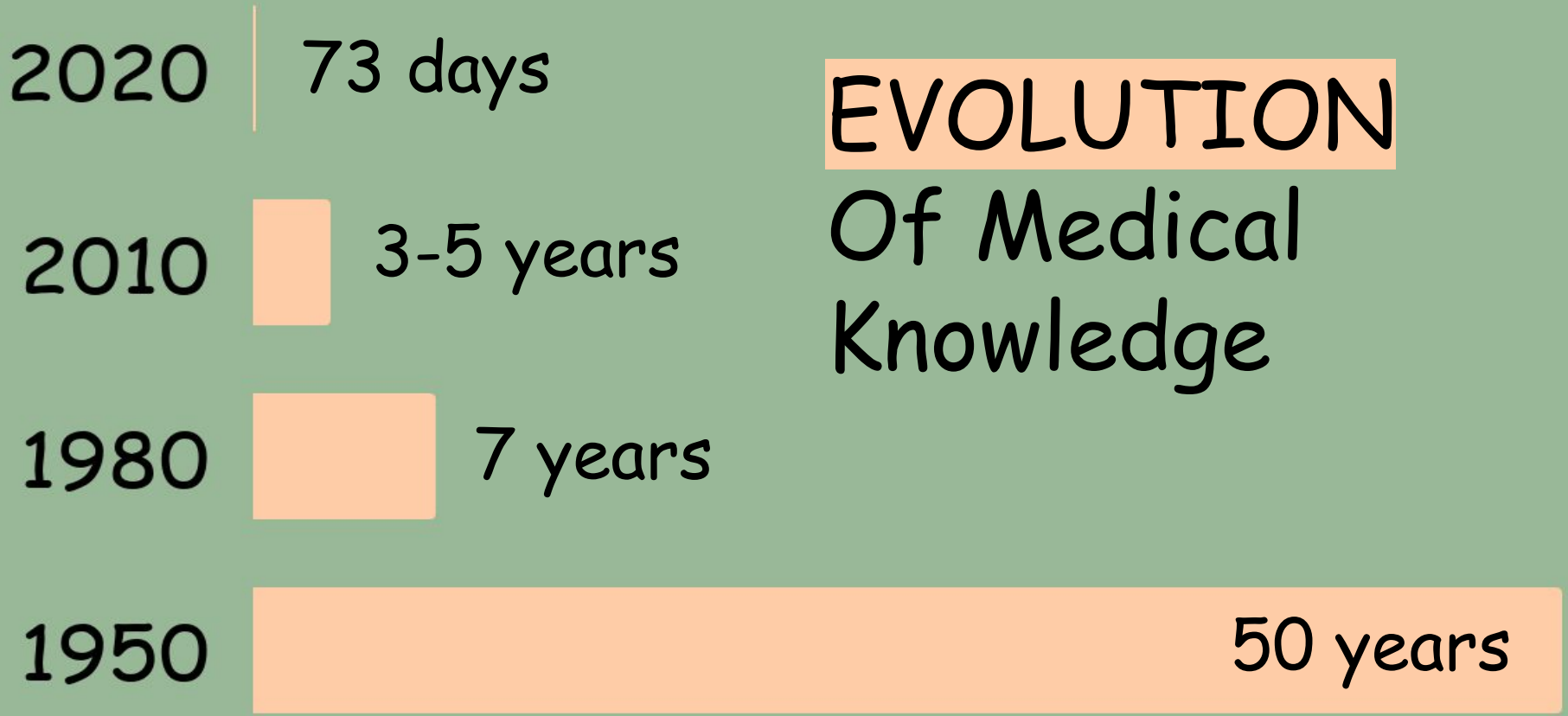


The impact of moving to digital and the power of network effects

TikTok has reached 1bn users faster than any other social media app

Monthy active users since product launch (millions)





EVOLUTION Of Medical Knowledge

http://bit.do/conhecimentomedico

Scientometrics (2022) 127:1609–1642
https://doi.org/10.1007/s11192-021-04260-y

Discovering temporal scientometric knowledge in COVID-19 scholarly production

Breno Santana Santos[1,2] · Ivanovitch Silva[1] · Luciana Lima[3] · Patricia Takako Endo[4] · Gisliany Alves[1] · Marcel da Câmara Ribeiro-Dantas[5]

Received: 7 October 2021 / Accepted: 22 December 2021 / Published online: 16 January 2022

Abstract
The mapping and analysis of scientific knowledge makes it possible to identify the dynamics and/or growth of a particular field of research or to support strategic decisions related to different research entities, based on bibliometric and/or scientometric indicators. However, with the exponential growth of scientific production, a systematic and data-oriented approach to the analysis of this large set of productions becomes increasingly essential. Thus, in this work, a data-oriented methodology was proposed, combining Data Analysis, Machine Learning and Complex Network Analysis techniques, and Data Version Control (DVC) tool, for the extraction of implicit knowledge in scientific production bases. In addition, the approach was validated through a case study in a COVID-19 manuscripts dataset, which had 199,895 articles published on arXiv, bioRxiv, medRxiv, PubMed and Scopus databases. The results suggest the feasibility of the proposed methodology, indicating the most active countries and the most explored themes in each period of the pandemic. Therefore, this study has the potential to instrument and expand strategic decisions by the scientific community, aiming at extracting knowledge that supports the fight against the COVID-19 pandemic.

More than 200k COVID-19 manuscripts published!!!!

$0.00

2010

$46,551.30

2022

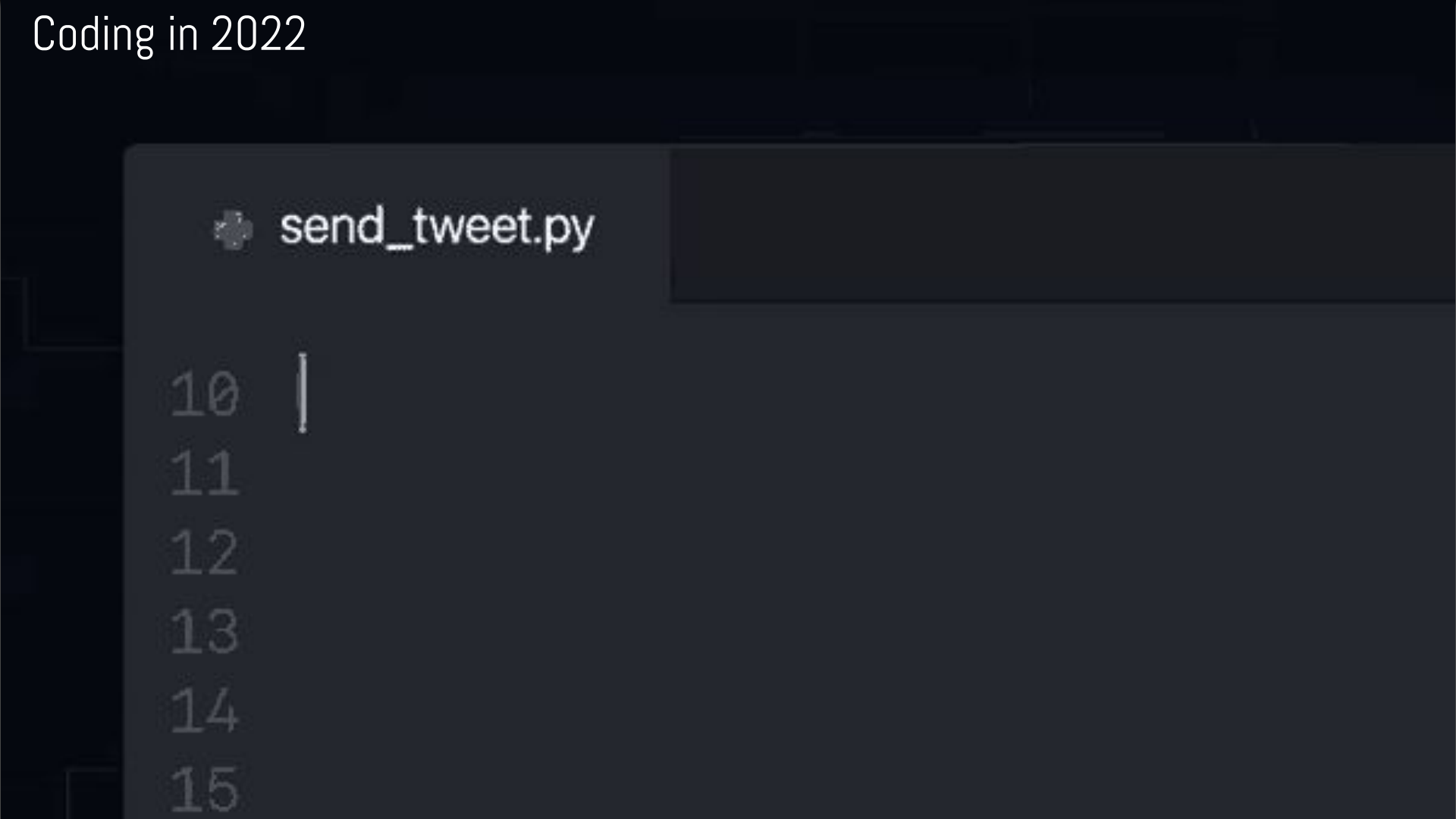

NVDA
M
Indicadores
Alerta
Replay
Salvar
Publicar
Abr 273.75 Máx. 275.58 Mín. 262.67 Fch 273.60 +0.74 (+0.27%)
273.60
0.00
273.60
USD
350.00
325.00
300.00
273.60
24d 10h
250.00
225.00
200.00
175.00
150.00
125.00
100.00
75.00
50.00
25.00
0.00
-25.00
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022


2022
MTAILOR

????


O TAMANHO M PARECE SER BOM!
BOM... EU ACHO QUE O P VAI SERVIR NÉ?
CollegeHumor

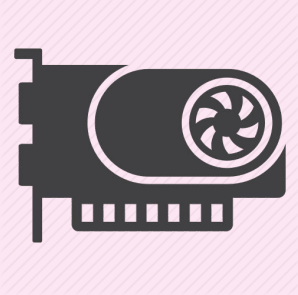
Coding in 2022



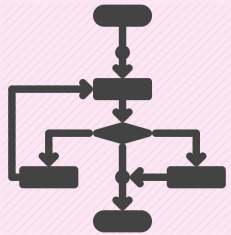
What do these techs have in common?

DATA

INTERNET



HARDWARE



TOOLS &
ALGORITHMS

ARTIFICIAL INTELLIGENCE

MLOps

ARTIFICIAL INTELLIGENCE

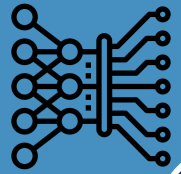
Any technique which enables computer to mimic human behavior

MACHINE LEARNING

AI techniques that give computers the ability to learn without being explicitly programed to do so

DEEP LEARNING

A subset of ML which make the computation of multi-layer neural network feasible



TinyML

GNN

DATA SCIENCE

1950 - 1980

1980 - 2010

2010 - **2022**

A Long Pathway

Vector & Matrices

Matrices & Vector Arithmetics
Types, Operations
Factorization

Calculus

Derivatives

@ivanovitchm/imd0033_2019_1

Exploratory Data Analysis

Measurements of Centrality (mean, mode, median, variance, std, z-score)

Data Pipeline

Collect, clean, preparation, model, analysis, interpretation, viz
Deploy, monitoring solution

Linear Algebra & Math | Probability & Statistics | Data Science | Machine Learning | Deep Learning

Probability

Conditional Probability
Distributions
Bayesian Probability

Statistics

Data Viz, Central Limit Theorem
Hypothesis Tests, Correlation
Resampling Methods

@ivanovitchm/datascience2020.6

Supervised Learning

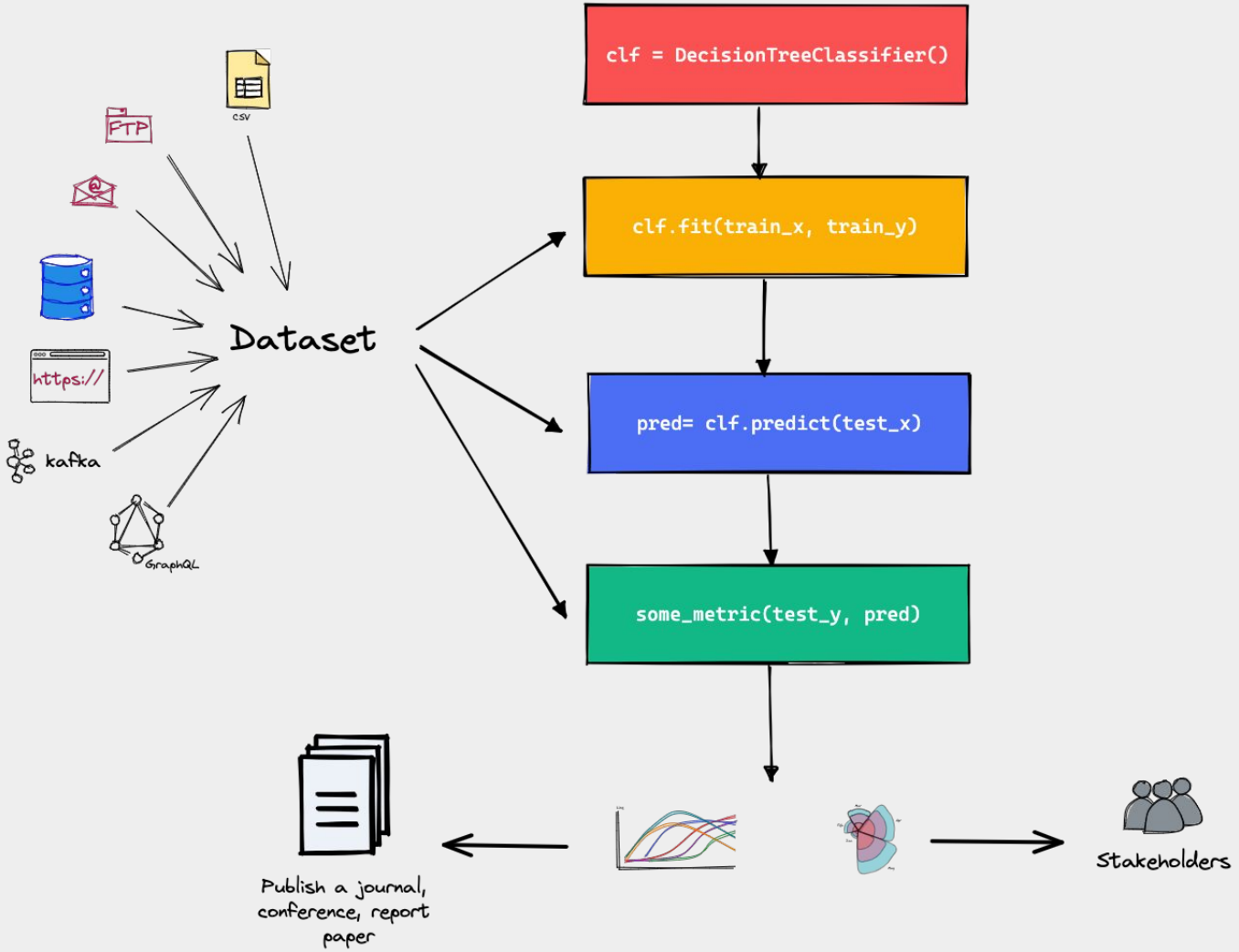
KNN, Linear regression, Logistic Regression, Decision Tree, Random Forest, Ensemble, XGBoost, MLP

Unsupervised Learning

K-Means, PCA

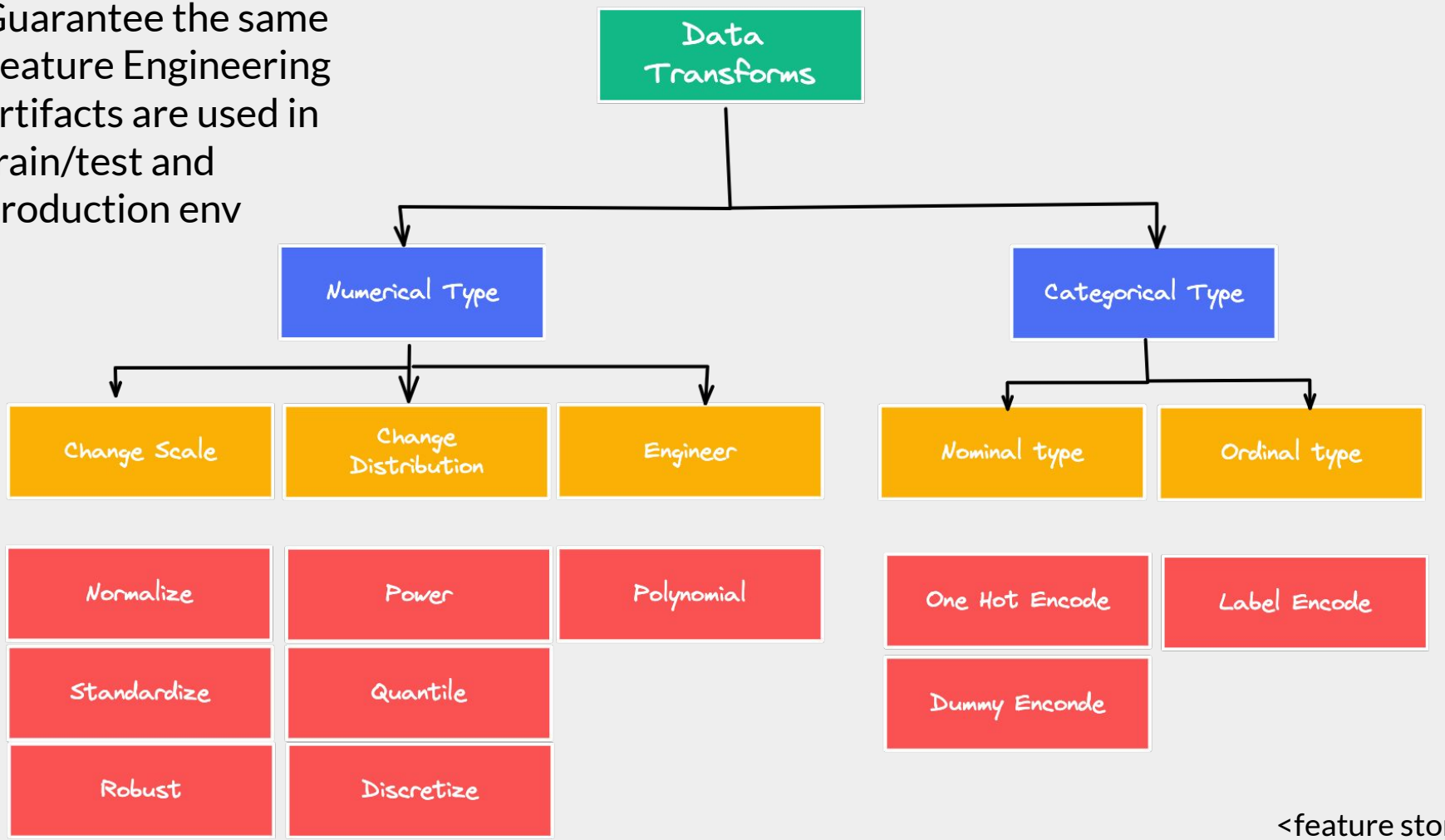
Fundamentals of Deep Learning
Better Generalization vs Better Learning
Hyperparameter tuning
Batch normalization
Convolutional Neural Networks
Transfer Learning

A typical ML workflow



My first ML models in production

Guarantee the same Feature Engineering artifacts are used in train/test and production env



<feature store>

education sciences

MDPI

Article

Predictive Models for Imbalanced Data: A School Dropout Perspective

Thiago M. Barros [1,*,†], Plácido A. Souza Neto [1,†] and Ivanovitch Silva [2,†] and Luiz Affonso Guedes [2,†]

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2 Federal University of Rio Grande do Norte (UFRN), 59078-970 Natal, Brazil; ivan@imd.
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* Correspondence: thiago.medeiros@ifrn.edu.br
† These authors contributed equally to this work.

Received: 24 July 2019; Accepted: 10 November 2019; Published: 15 November 2019

Abstract: Predicting school dropout rates is an important issue for the smooth
educational system. This problem is solved by classifying students into two classes
activities related statistical datasets. One of the classes must identify the students who have the tendency to persist. The other class must identify the students who have the tendency to dropout. This problem often encounters a phenomenon that masks out the obtained results. This study delves into this phenomenon and provides a reliable educational data mining technique that accurately predicts the dropout rates. In particular, the three data classifying techniques, namely, decision tree, neural networks and Balanced Bagging, are used. The performances of these classifies are tested with and without the use of a downsample, SMOTE and ADASYN data balancing. It is found that among other parameters geometric mean and UAR provides reliable results while predicting the dropout rates using Balanced Bagging classifying techniques.

Keywords: dropout rates; accuracy paradox; imbalanced learning; downsample; g-mean predict; mlp; decision tree; Balanced Bagging; UAR; SMOTE; ADASYN

Concept/Data Drift

g1 EDUCAÇÃO

Evasão escolar de crianças e adolescente aumenta 171% na pandemia, diz estudo

Levantamento da organização Todos Pela Educação mostra que 244 mil crianças de 6 a 14 anos estavam fora da escola no segundo trimestre de 2021.

Por g1 ... São Paulo
...lizado há 3 meses

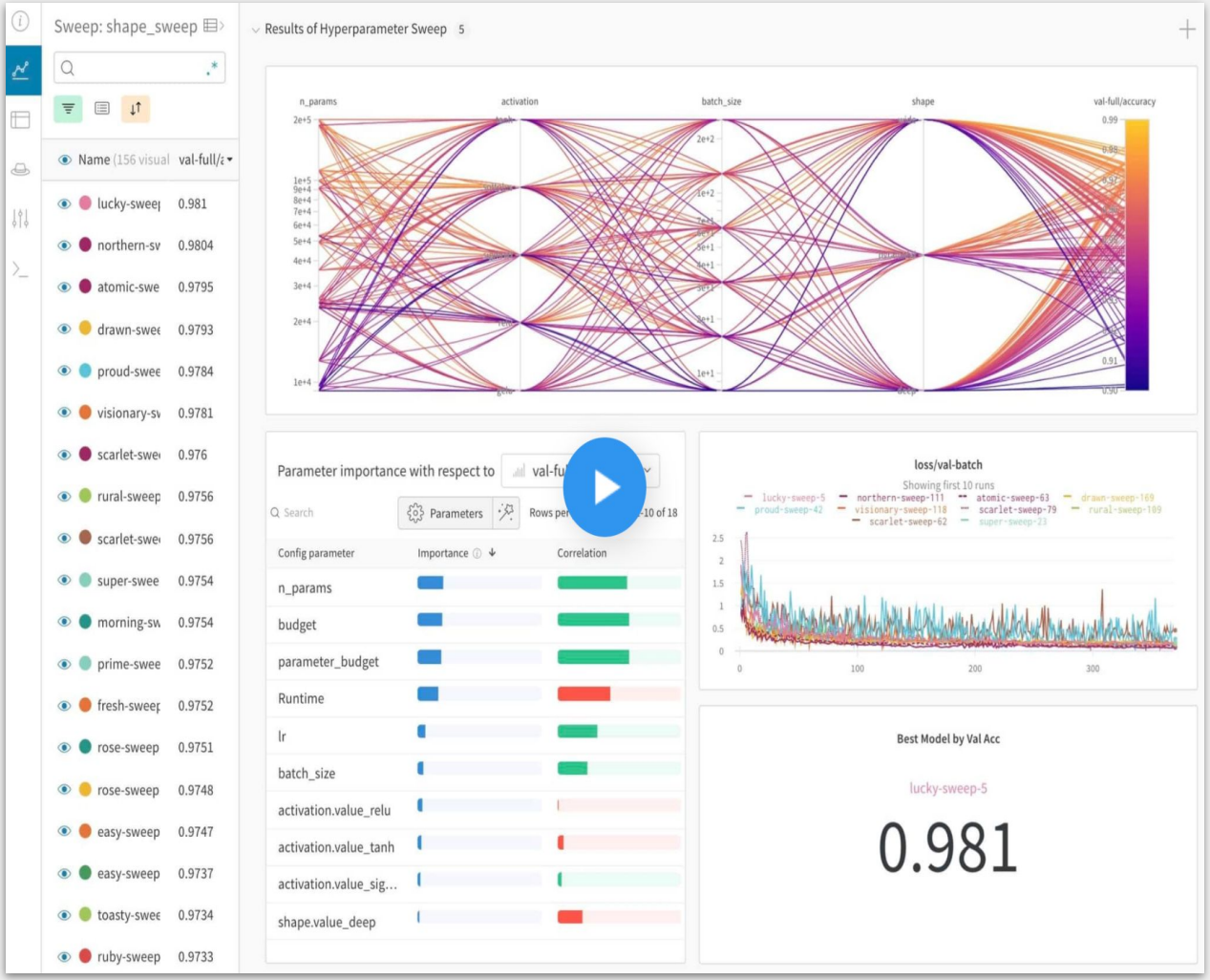
...is de 650 mil crianças ...am da escola durante a ...demia

Pela primeira vez desde 2005, país registrou queda de matrículas na educação infantil

PERSPECTIVA 2022

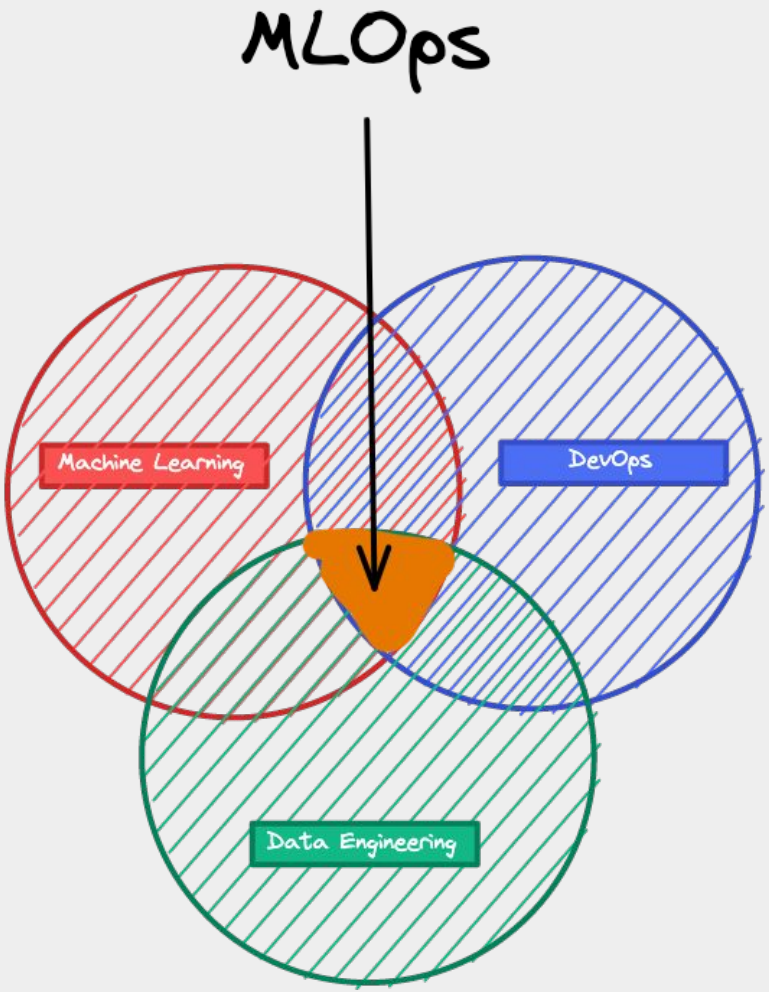
Evasão escolar bate recordes durante a pandemia

Colégios abertos, mas sem alunos. Com cerca de 240 mil estudantes fora das salas de aula a desistência é o maior desafio de 2022. Especialistas afirmam que esse é o pior cenário em 20 anos

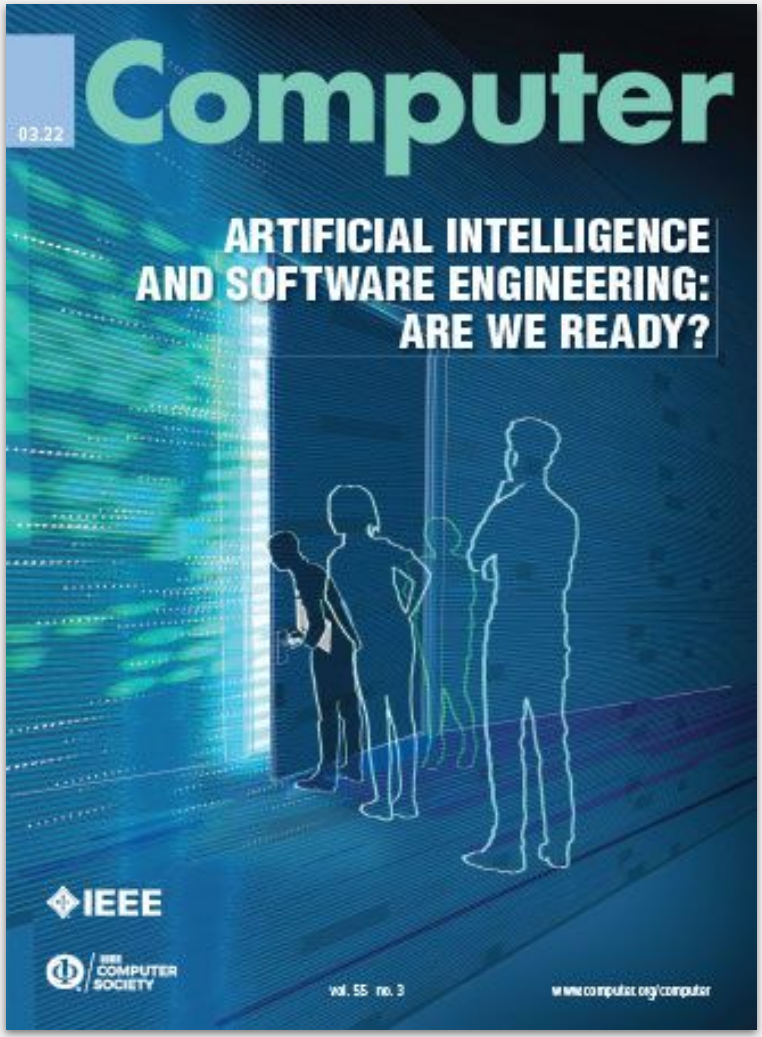


What settings were used in the last experiment?

experiment tracking
dataset versioning
model management


MLOps
Machine Learning
DevOps
Data Engineering


Data
Code
Model



S. Warnett and U. Zdun, "*Architectural Design Decisions for the Machine Learning Workflow*" in **Computer**, vol. 55, no. 03, pp. 40-51, 2022. Doi: 10.1109/MC.2021.3134800

H. Washizaki, et al.,"*Software-Engineering Design Patterns for Machine Learning Applications*" in **Computer**, vol. 55, no. 03, pp. 30-39, 2022. doi: 10.1109/MC.2021.3137227

A. Mashkoor, T. Menzies, A. Egyed and R. Ramler, "*Artificial Intelligence and Software Engineering: Are We Ready?*" in **Computer**, vol. 55, no. 03, pp. 24-28, 2022. doi: 10.1109/MC.2022.3144805

R. Sangwan, Y. Badr, S. Srinivasan and P. Mukherjee, "*On the Testability of Artificial Intelligence and Machine Learning Systems*" in **Computer**, vol. 55, no. 03, pp. 101-105, 2022. doi: 10.1109/MC.2021.3132710

DATA VIOLENCE

How Bad Engineering Choices Can Damage Society

EL PAÍS

Por que a demissão de pesquisadora negra do Google se transformou em escândalo global

O silenciamento e a saída de Timnit Gebru geram novas dúvidas sobre o compromisso das grandes empresas de tecnologia com seus propósitos éticos

Timnit Gebru, pesquisadora de inteligência artificial ética demitida pelo Google. MEDIUM

Model Cards for Model Reporting

Margaret Mitchell, Simone Wu, Andrew Zaldivar, Parker Barnes, Lucy Vasserman, Ben Hutchinson, Elena Spitzer, Inioluwa Deborah Raji, Timnit Gebru
{mmitchellai,simonewu,andrewzaldivar,parkerbarnes,lucyvasserman,benhutch,espitzer,tgebru}@google.com
deborah.raji@mail.utoronto.ca

ABSTRACT

Trained machine learning models are increasingly used to perform high-impact tasks in areas such as law enforcement, medicine, education, and employment. In order to clarify the intended use cases of machine learning models and minimize their usage in contexts for which they are not well suited, we recommend that released models be accompanied by documentation detailing their performance characteristics. In this paper, we propose a framework that we call model cards, to encourage such transparent model reporting. Model cards are short documents accompanying trained machine learning models that provide benchmarked evaluation in a variety of conditions, such as across different cultural, demographic, or phenotypic groups (e.g., race, geographic location, sex, Fitzpatrick skin type [15]) and intersectional groups (e.g., age and race, or sex and Fitzpatrick skin type) that are relevant to the intended application domains. Model cards also disclose the context in which models are intended to be used, details of the performance evaluation procedures, and other relevant information. While we focus primarily on human-centered machine learning models in the application fields of computer vision and natural language processing, this framework can be used to document any trained machine learning model. To solidify the concept, we provide cards for two supervised models: One trained to detect smiling faces in images, and one trained to detect toxic comments in text. We propose model cards as a step towards the responsible democratization of machine learning and related artificial intelligence technology, increasing transparency into how well artificial intelligence technology works. We hope this work encourages those releasing trained machine learning models to accompany model releases with similar detailed evaluation numbers and other relevant documentation.

CCS CONCEPTS

• **General and reference** → **Evaluation**; • **Social and professional topics** → *User characteristics*; • **Software and its engineering** → **Use cases**; *Documentation*; *Software evolution*; • **Human-centered computing** → *Walkthrough evaluations*

KEYWORDS

datasheets, model cards, documentation, disaggregated evaluation, fairness evaluation, ML model evaluation, ethical considerations

ACM Reference Format:
Margaret Mitchell, Simone Wu, Andrew Zaldivar, Parker Barnes, Lucy Vasserman, Ben Hutchinson, Elena Spitzer, Inioluwa Deborah Raji, Timnit Gebru. 2019. Model Cards for Model Reporting. In *FAT* '19: Conference on Fairness, Accountability, and Transparency, January 29–31, 2019, Atlanta, GA, USA.* ACM, New York, NY, USA, 10 pages. https://doi.org/10.1145/3287560.3287596

1 INTRODUCTION

Currently, there are no standardized documentation procedures to communicate the performance characteristics of trained machine learning (ML) and artificial intelligence (AI) models. This lack of documentation is especially problematic when models are used in applications that have serious impacts on people's lives, such as in health care [14, 42, 44], employment [1, 13, 29], education [23, 45] and law enforcement [2, 7, 20, 34].

Researchers have discovered systematic biases in commercial machine learning models used for face detection and tracking [4, 9, 49], attribute detection [5], criminal justice [10], toxic comment detection [11], and other applications. However, these systematic errors were only exposed after models were put into use, and negatively affected users reported their experiences. For example, after MIT Media Lab graduate student Joy Buolamwini found that commercial face recognition systems failed to detect her face [4], she collaborated with other researchers to demonstrate the disproportionate errors of computer vision systems on historically marginalized groups in the United States, such as darker-skinned women [5, 41]. In spite of the potential negative effects of such reported biases, documentation accompanying trained machine learning models (if supplied) provide very little information regarding model performance characteristics, intended use cases, potential pitfalls, or other information to help users evaluate the suitability of these systems to their context. This highlights the need to have detailed documen-

isola.ai

+100k papers

ELSEVIER

COVID-19: A scholarly production dataset report for research analysis

Breno Santana Santos[a,b,*], Ivanovitch Silva[a], Marcel da Câmara Ribeiro-Dantas[c], Gisliany Alves[a], Patricia Takako Endo[d] and Luciana Lima[a]

[a] Universidade Federal do Rio Grande do Norte (UFRN), Rio Grande do Norte, Brazil
[b] Núcleo de Pesquisa e Prática em Inteligência Competitiva (NUPIC), Universidade Federal de Sergipe (UFS), Itabaiana/SE, Brazil
[c] Institut Curie (UMR168), Sorbonne Université (EDITE), Paris, France
[d] Universidade de Pernambuco (UPE), Pernambuco, Brazil

ARTICLE INFO

Keywords:
COVID-19
SARS-CoV-2
Pandemic
Data Science
Bibliometrics
Scientometrics

ABSTRACT

COVID-2019 has been recognized as a global threat, and several studies are being conducted in order to contribute to the fight and prevention of this pandemic. This work presents a scholarly production dataset focused on COVID-19, providing an overview of scientific research activities, making it possible to identify countries, scientists and research groups most active in this task force to combat the coronavirus disease. The dataset is composed of 40,212 records of articles' metadata collected from Scopus, PubMed, arXiv and bioRxiv databases from January 2019 to July 2020. Those data were extracted by using the techniques of Python Web Scraping and pre-processed with Pandas Data Wrangling. In addition, the pipeline to preprocess and generate the dataset are versioned with the Data Version Control tool (DVC) and are thus easily reproducible and auditable.

Brazil is one of the most densely populated countries in the world. The outbreak has affected more than 600,000 people and put the country on the front line of the global pandemic. As the outbreak continues to spread, the health and socioeconomic reforms of the president and his government have been criticised for being overly harsh. This analysis attempts to understand the reasons behind the policies and why they are being so harshly criticised, and how the institutional changes and the administration have been ineffective in dampening the disease. In particular, the reasons for the policies are discussed. It is argued that the policies are overly harsh not only because of the lack of economic growth but also because of the lack of social and health security, making it difficult to pay the healthcare bill. The authors conclude that the policies are counterproductive and the policies need to be reformed. This study provides a framework for analysing the policies of the government and the subsequent failure in their implementation.

Created by GPT-2

Who would be the author of that text?

100%
Unique

0%
Plagiarism

What if?


Instituto Nacional da Propriedade Industrial
Buscar no Site
INPI INSTITUTO NACIONAL DA PROPRIEDADE INDUSTRIAL
Alguma dúvida?
MARCAS
PATENTES
DESENHOS INDUSTRIAIS
INDICAÇÕES GEOGRÁFICAS
PROGRAMAS DE COMPUTADOR
TOPOGRAFIAS DE CIRCUITOS INTEGRADOS
CONTRATOS DE TECNOLOGIA E DE FRANQUIA
ACADEM DO INP
Chatbot
Alguma dúvida?
Chatbot do INPI
DISPONÍVEL 24/7
DE MAIS
VALOR
À SUA
CRIAÇÃO!

State of the Art

*non traditional

arXiv.org

arXiv is a free distribution service and an open-access archive for 1,833,415 scholarly articles in the fields of physics, mathematics, computer science, quantitative biology, quantitative finance, statistics, electrical engineering and systems science, and economics. Materials on this site are not peer-reviewed by arXiv.

Subject search and browse:

Physics Search Form Interface Catchup

News

Read about recent news and updates on arXiv's blog. (View the former "what's new" pages here). Read robots beware before attempting any automated download.

COVID-19 Quick Links

See COVID-19 SARS-CoV-2 preprints from

- arXiv
- medRxiv and bioRxiv

Important: e-prints posted on arXiv are not peer-reviewed by arXiv; they should not be relied upon without context to guide clinical practice or health-related behavior and should not be reported in news media as established information without consulting multiple experts in the field.

Physics

- Astrophysics (**astro-ph** new, recent, search)
  includes: Astrophysics of Galaxies; Cosmology and Nongalactic Astrophysics; Earth and Planetary Astrophysics; High Energy Astrophysical Phenomena; Instrumentation and Methods for Astrophysics; Solar and Stellar Astrophysics
- Condensed Matter (**cond-mat** new, recent, search)
  includes: Disordered Systems and Neural Networks; Materials Science; Mesoscale and Nanoscale Physics; Other Condensed Matter; Quantum Gases; Soft Condensed Matter; Statistical Mechanics; Strongly Correlated Electrons; Superconductivity
- General Relativity and Quantum Cosmology (**gr-qc** new, recent, search)
- High Energy Physics - Experiment (**hep-ex** new, recent, search)
- High Energy Physics - Lattice (**hep-lat** new, recent, search)
- High Energy Physics - Phenomenology (**hep-ph** new, recent, search)
- High Energy Physics - Theory (**hep-th** new, recent, search)
- Mathematical Physics (**math-ph** new, recent, search)
- Nonlinear Sciences (**nlin** new, recent, search)
  includes: Adaptation and Self-Organizing Systems; Cellular Automata and Lattice Gases; Chaotic Dynamics; Exactly Solvable and Integrable Systems; Pattern Formation and Solitons

Papers With Code

https://paperswithcode.com/

Computer Vision

Semantic Segmentation

80 benchmarks

1462 papers with code

Image Classification

184 benchmarks

1275 papers with code

Object Detection

299 benchmarks

1076 papers with code

Image Generation

134 benchmarks

509 papers with code

Denoising

95 benchmarks

467 papers with code

See all 965 tasks

Medical

Medical Image Segmentation

171 benchmarks

131 papers with code

Drug Discovery

14 benchmarks

105 papers with code

Lesion Segmentation

5 benchmarks

75 papers with code

Brain Tumor Segmentation

7 benchmarks

44 papers with code

COVID-19 Diagnosis

40 papers with code

See all 199 tasks

@paperwithcode

Natural Language Processing

Machine Translation

56 benchmarks

977 papers with code

Language Modelling

19 benchmarks

962 papers with code

Question Answering

66 benchmarks

863 papers with code

Sentiment Analysis

50 benchmarks

584 papers with code

Text Generation

49 benchmarks

416 papers with code

See all 363 tasks

Graphs

Link Prediction

52 benchmarks

304 papers with code

Node Classification

61 benchmarks

249 papers with code

Graph Embedding

1 benchmark

168 papers with code

Graph Classification

46 benchmarks

139 papers with code

Community Detection

12 benchmarks

107 papers with code

See all 63 tasks

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DeepFake Detector AIs Are Good Too!

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YouTube

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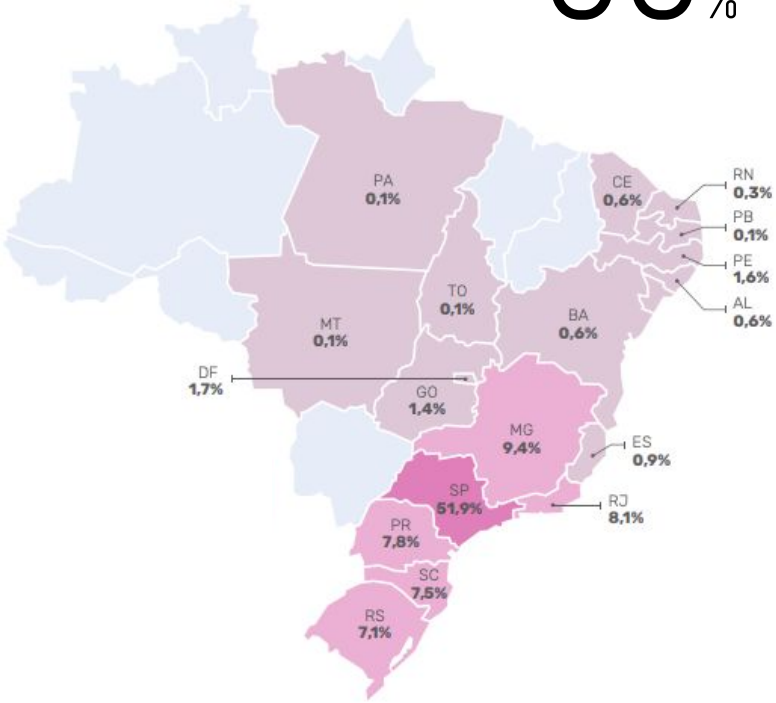
EXPANDINDO OS HORIZONTES DA INTELIGÊNCIA ARTIFICIAL

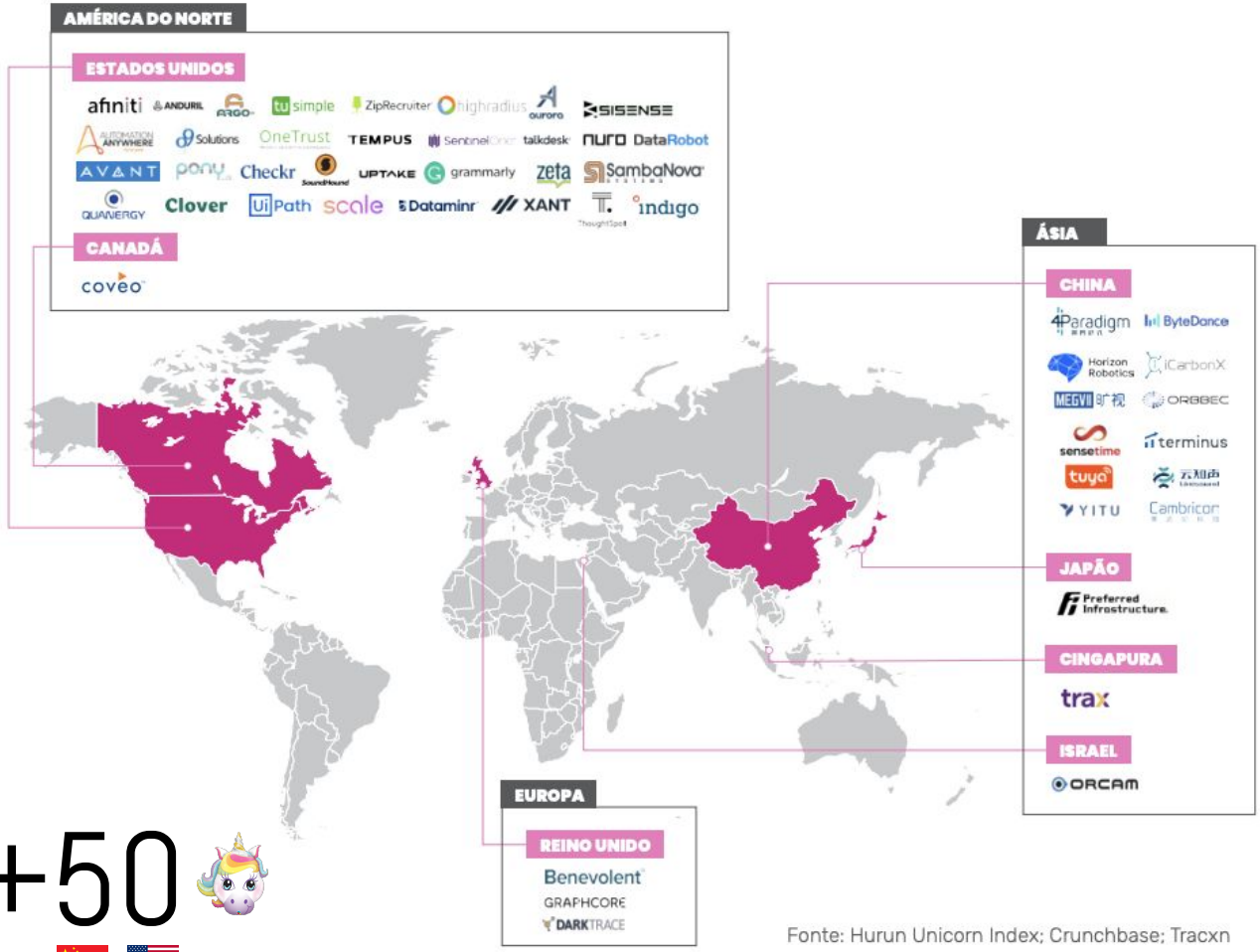
https://distrito.me/dataminer/reports/

AS STARTUPS DE INTELIGÊNCIA ARTIFICIAL ESTÃO CONCENTRADAS NO EIXO SUL-SUDESTE

93%



Contextualização



+50

Fonte: Hurun Unicorn Index; Crunchbase; Tracxn

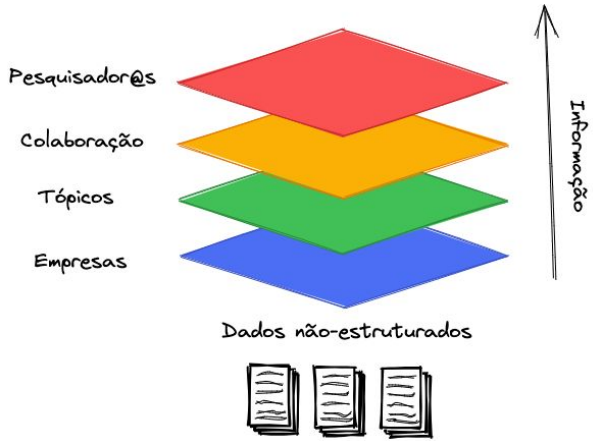
Decacórnios

UiPath

ByteDance 字节跳动

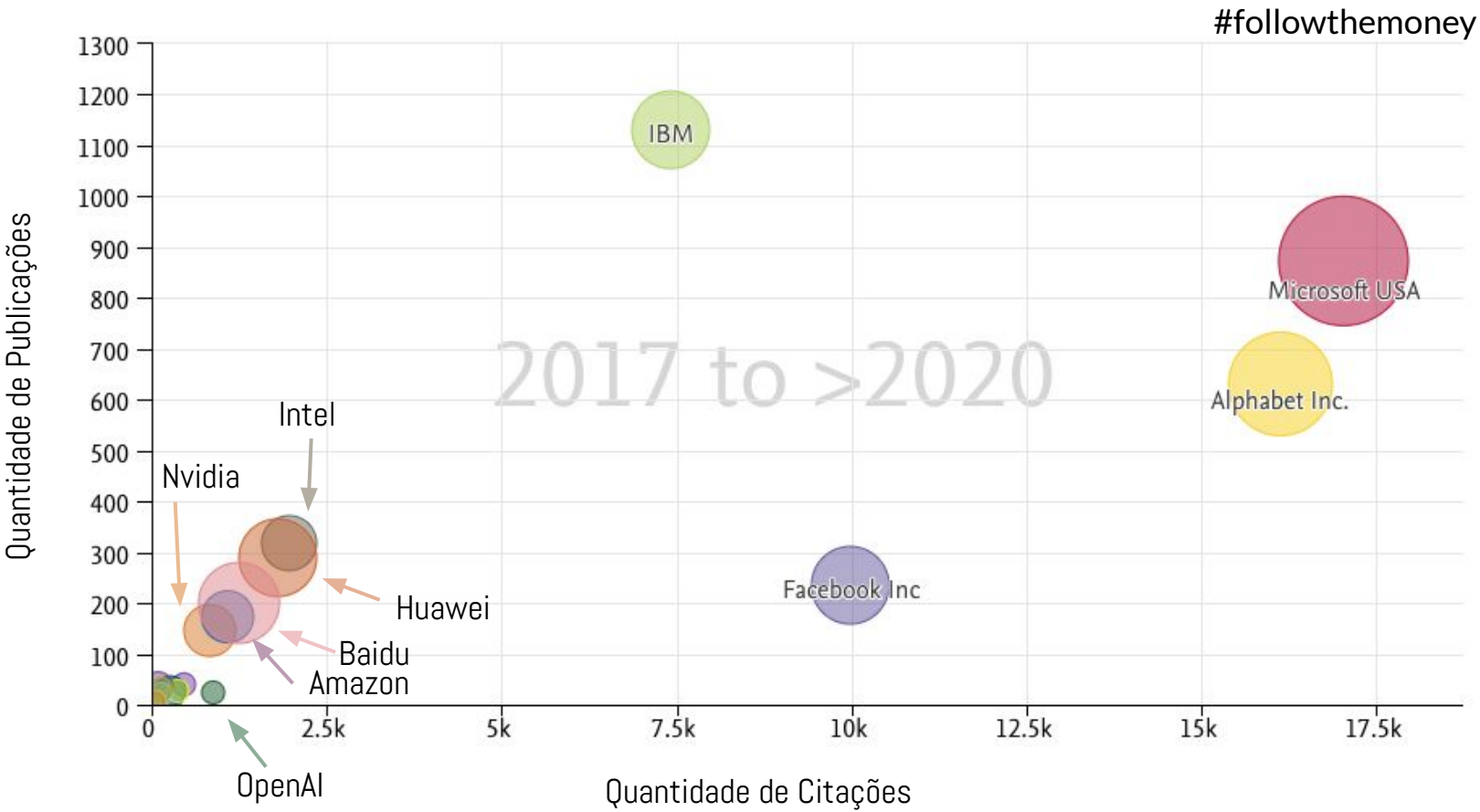
ELSEVIER

SciVal

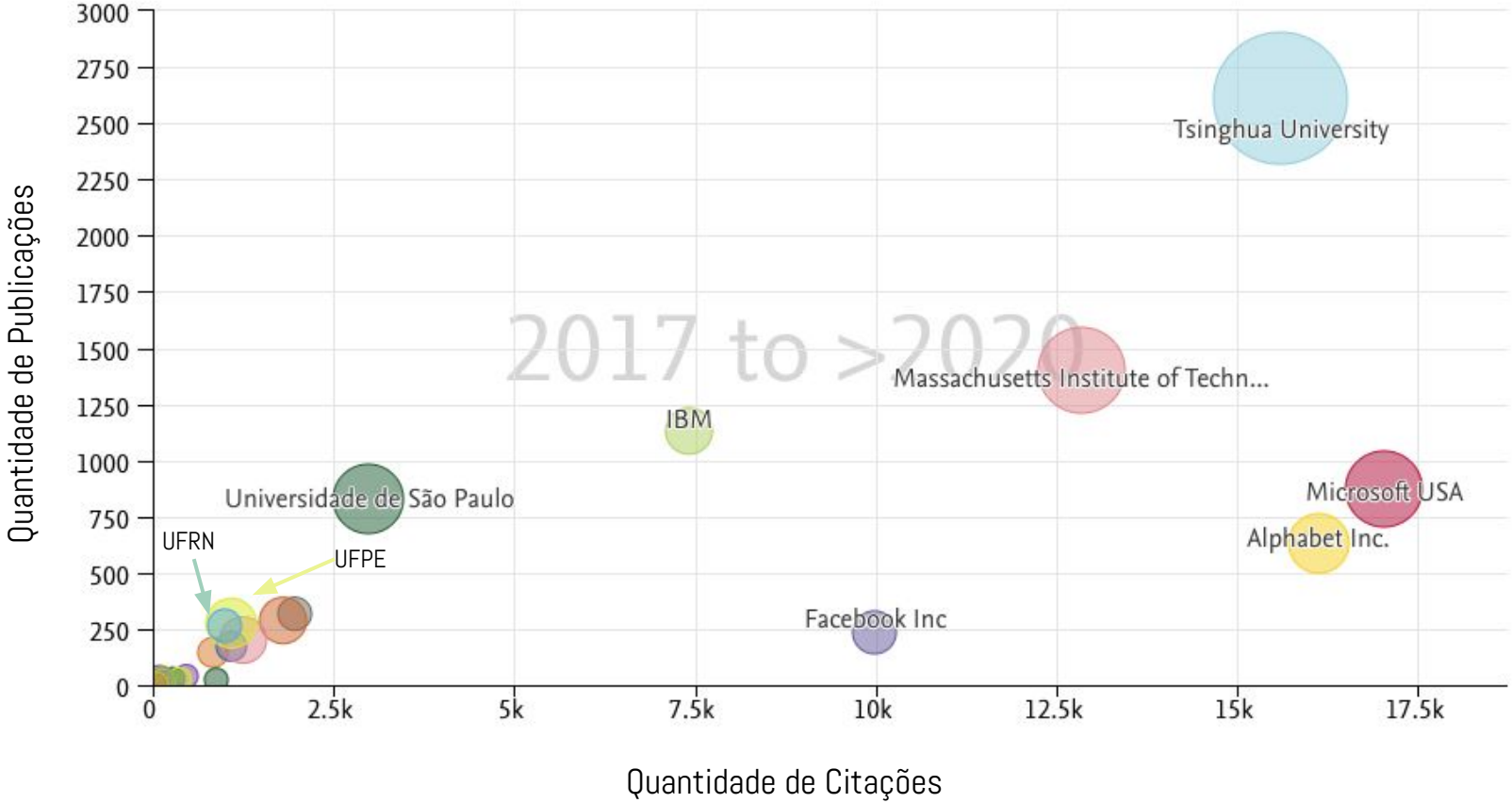



23andMe
Apple
Microsoft
SPACEX
Baidu 百度
airbnb
DELL
NETFLIX
TESLA
字节跳动
ByteDance
Alphabet
facebook
NVIDIA
twitter
HIKVISION
amazon
GoPro
Be a HERO.
OpenAI
Uber
HUAWEI
intel
lyft
ORACLE
IBM
SMIC

#followthemoney



+10x publicações
+15x citações
+15x pub. Top 10%



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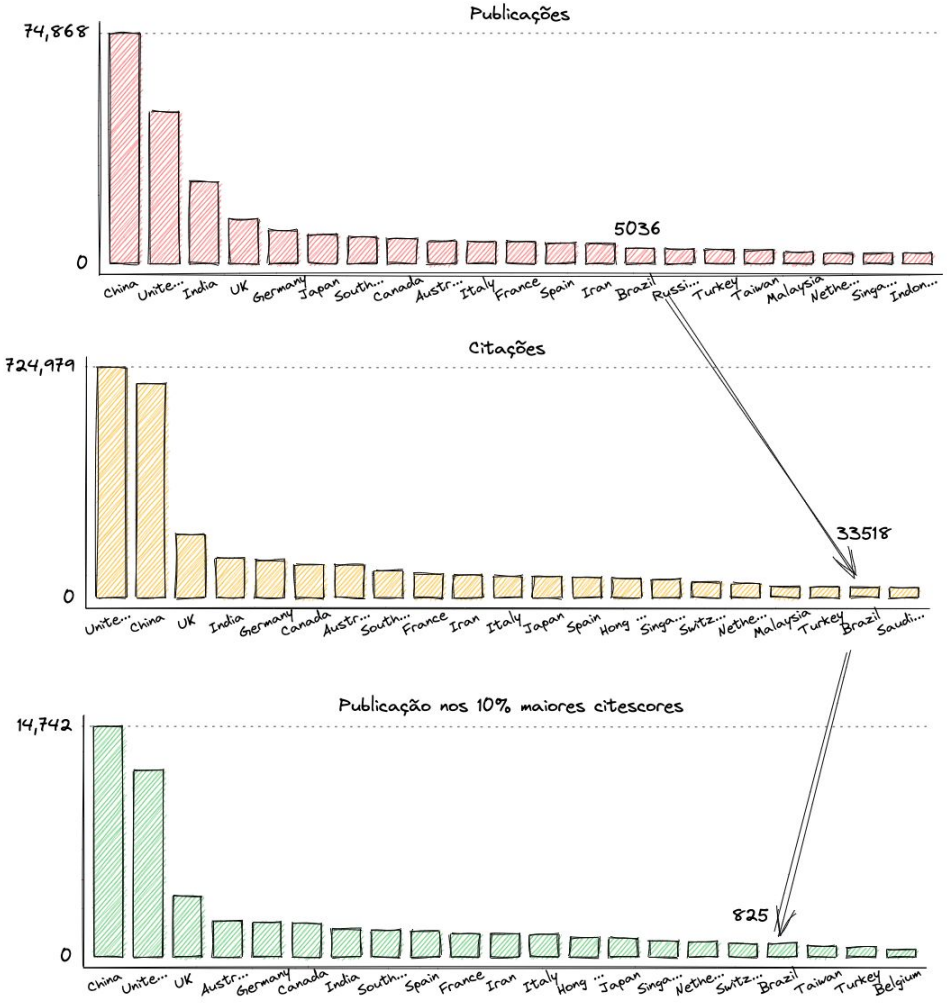

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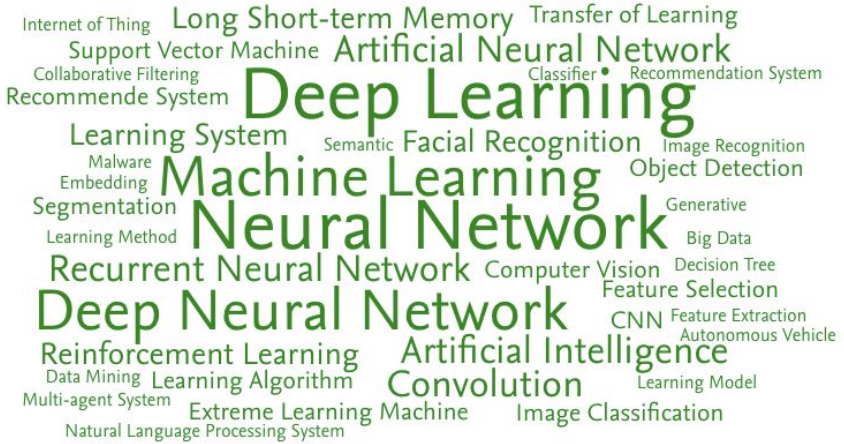
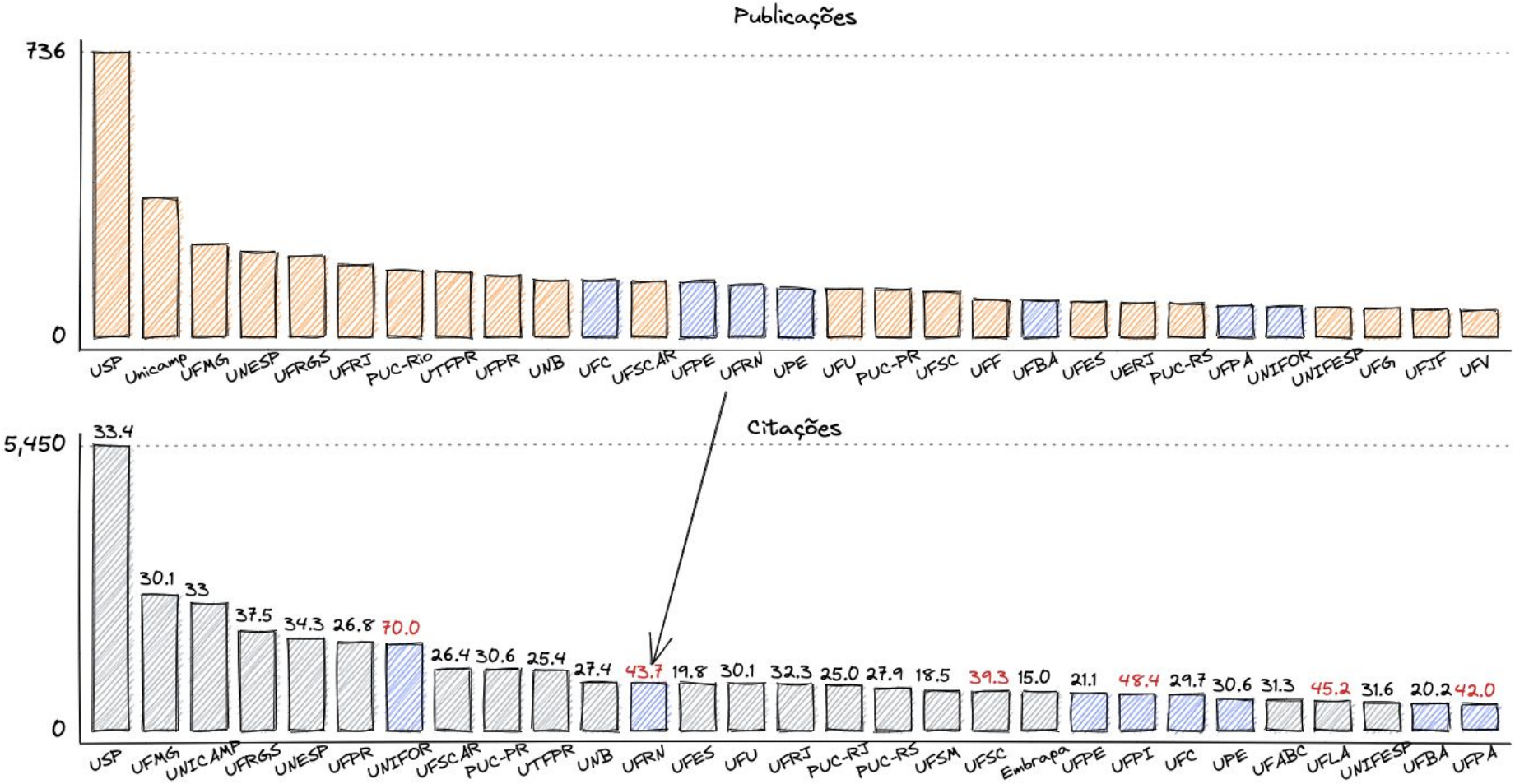
publicações

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USP
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UFPE
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UFU
PUC-PR
UFSC
UFF
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UFES
UERJ
PUC-RS
UFPA
UNIFOR
UNIFESP
UFG
UFJF
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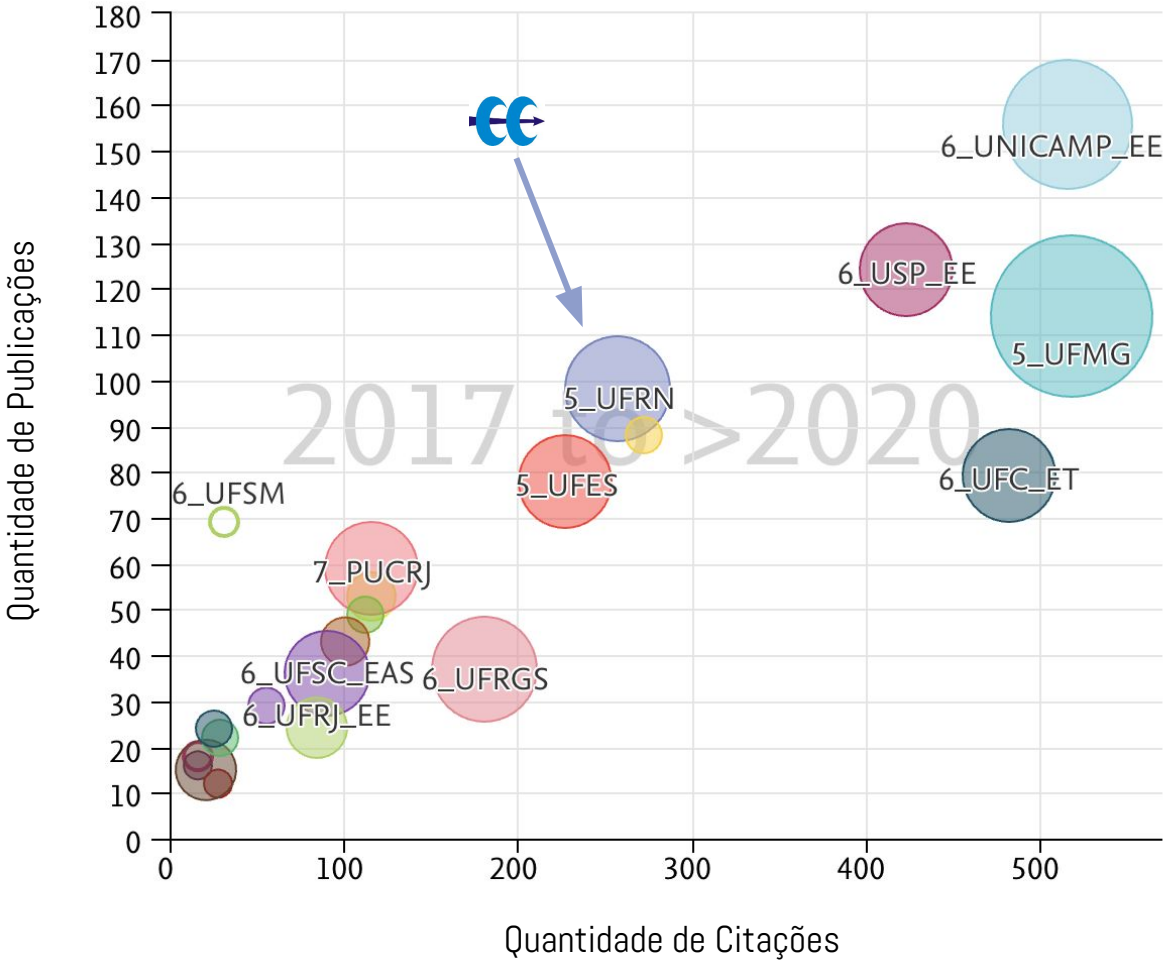
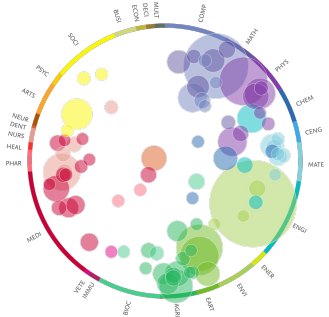


Computer Science (13)

- Artificial Intelligence
- Computational Theory and Mathematics
- Computer Graphics and Computer-Aided Design
- Computer Networks and Communications
- Computer Science (miscellaneous)
- Computer Science Applications
- Computer Vision and Pattern Recognition
- General Computer Science
- Hardware and Architecture

Tópicos e Áreas de Atuação entre Instituições



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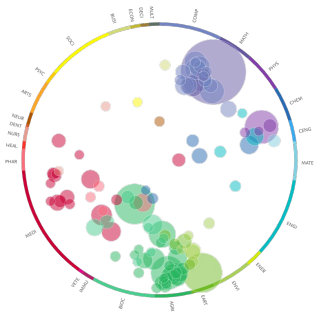

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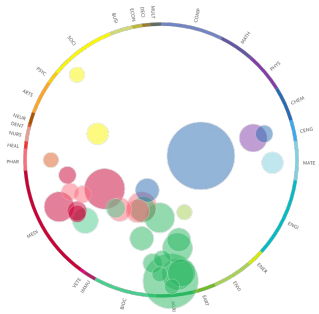

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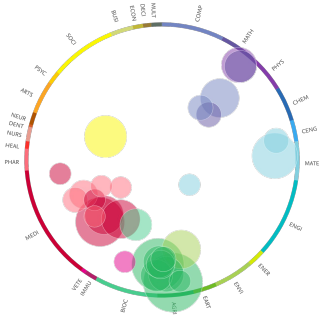

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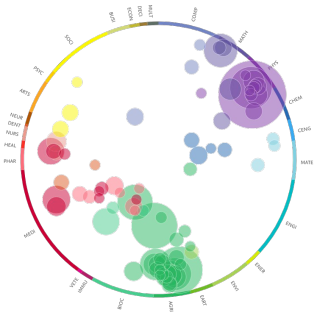

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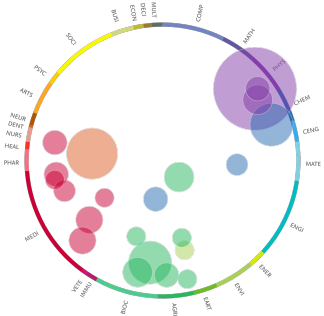

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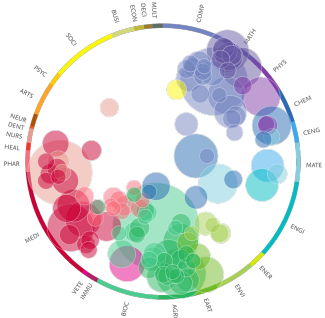

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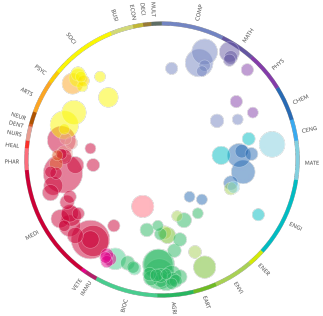
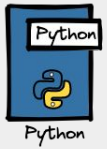
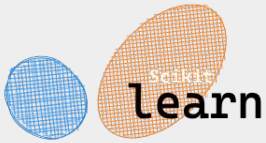
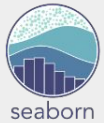


UFBA

Course Outline





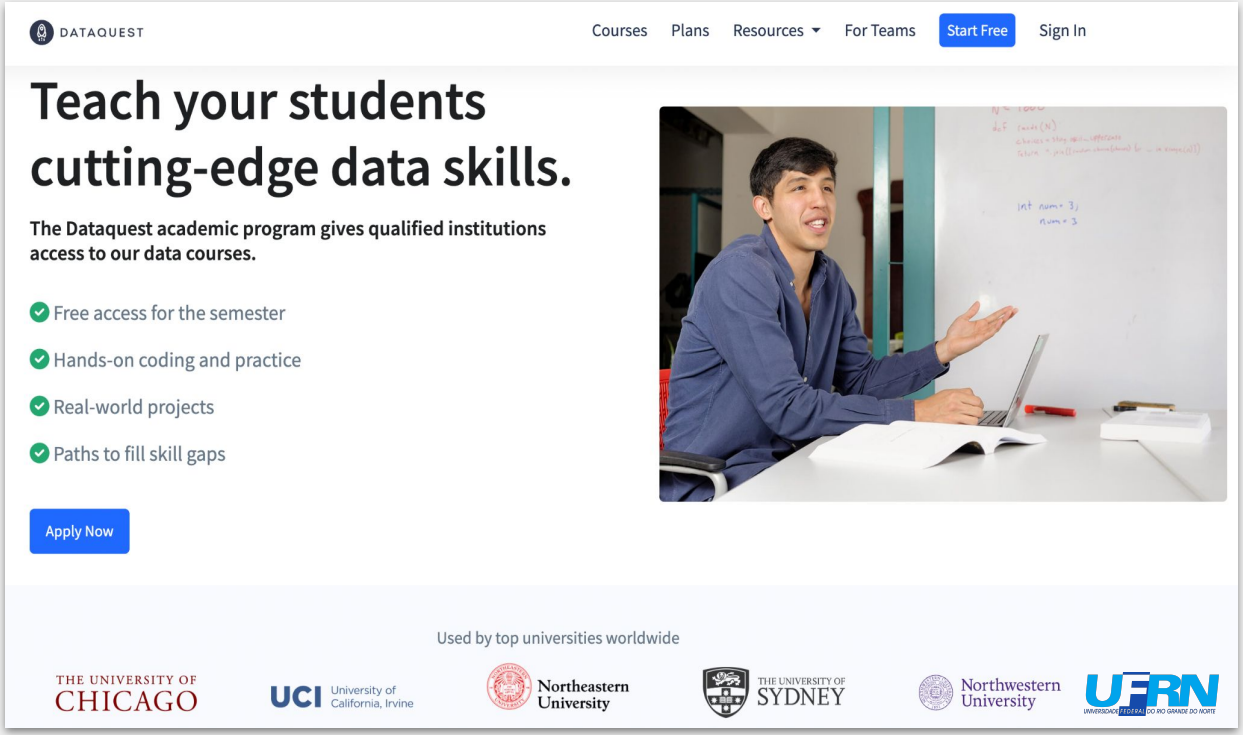


Linear Algebra & Math	Probability & Statistics	Data Science	Machine Learning	Deep Learning

Supervised Learning

Decision Tree
Random Forest
Ensemble
XGBoost

Fundamentals of Deep Learning
Better Generalization vs Better Learning
Hyperparameter tuning
Batch normalization
Convolutional Neural Networks
Transfer Learning



Flipped Classroom

Active Learning

Complementary Material

Career Paths

Data Scientist With Python
Data Analyst With R
Data Analyst in Python
Data Engineering
Business Analyst

Dataquest Method

Learn with real-world data
Complete exercises and get feedback
Build your portfolio with projects

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About

Repository for EEC1509, a graduate course on PPgEEC about Machine Learning

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