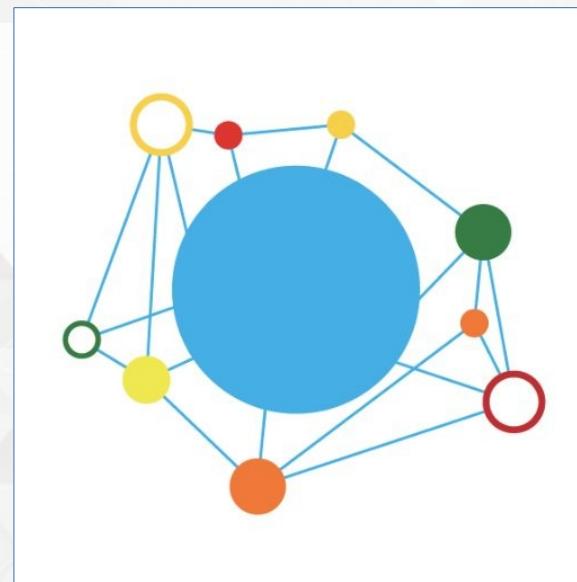


# Fundamentos de Machine Learning

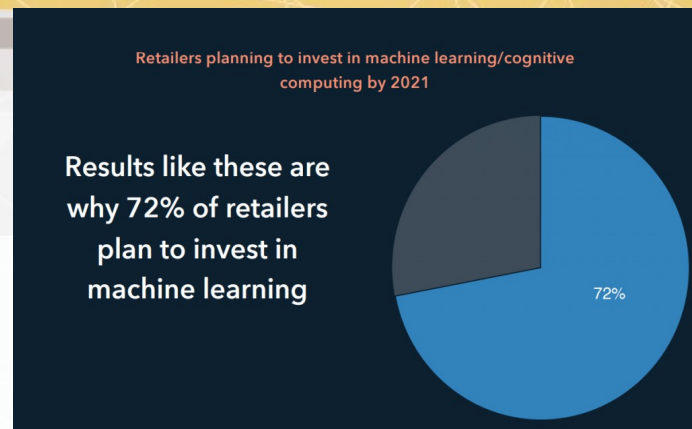
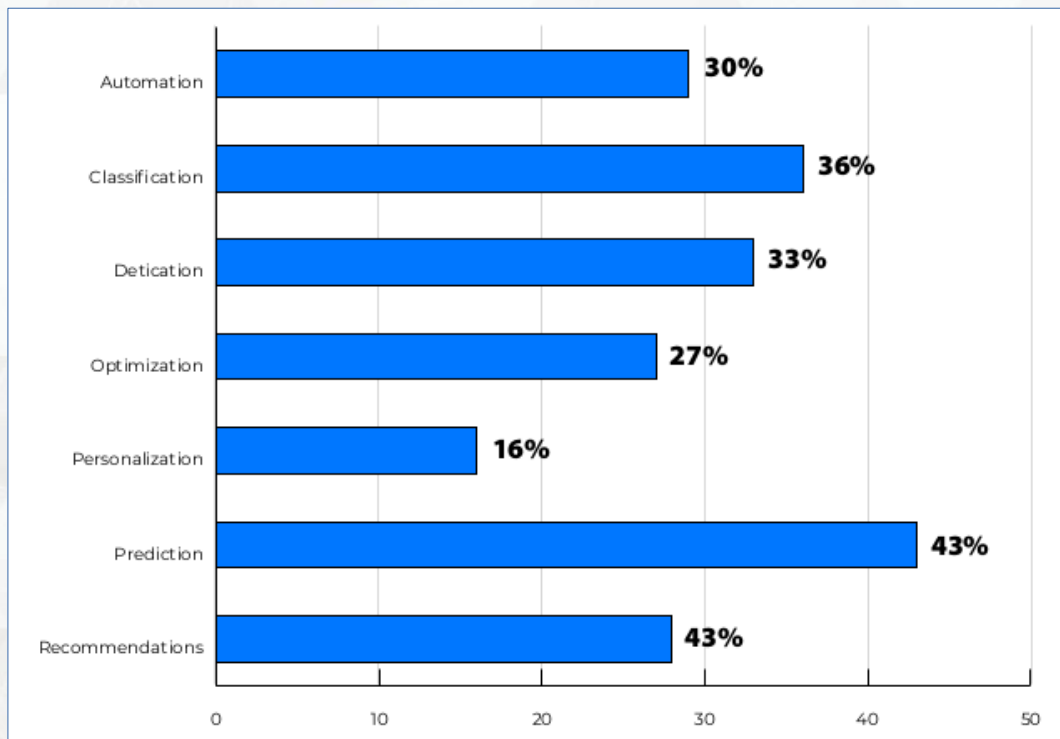
2023

# Machine Learning

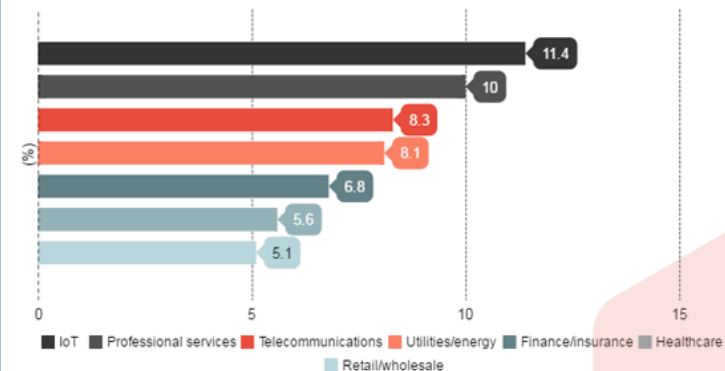
- Buzzword do momento
  - Se tornou sinônimo de IA, mesmo sendo somente um dos campos dela
  - Todo mundo está tentando vender alguma coisa com ML...
- ML experimentou um crescimento sem precedentes
  - Resolução de problemas, automação de tarefas
- Razões para isso se acumularam por décadas
  - Bases científicas existem a muito tempo
    - Redes neurais foram desenvolvidas nos anos 1950
    - Regressões são usadas em estatística a mais tempo
  - Melhorias pontuais, mas significativas em IA e ML
  - Avanço em capacidades computacionais
  - Explosão de disponibilidade de dados
    - Sistemas corporativos desde os anos 1980/1990
    - Big Data
    - IoT, wearable devices, sensores, indústria, etc.



# Contexto



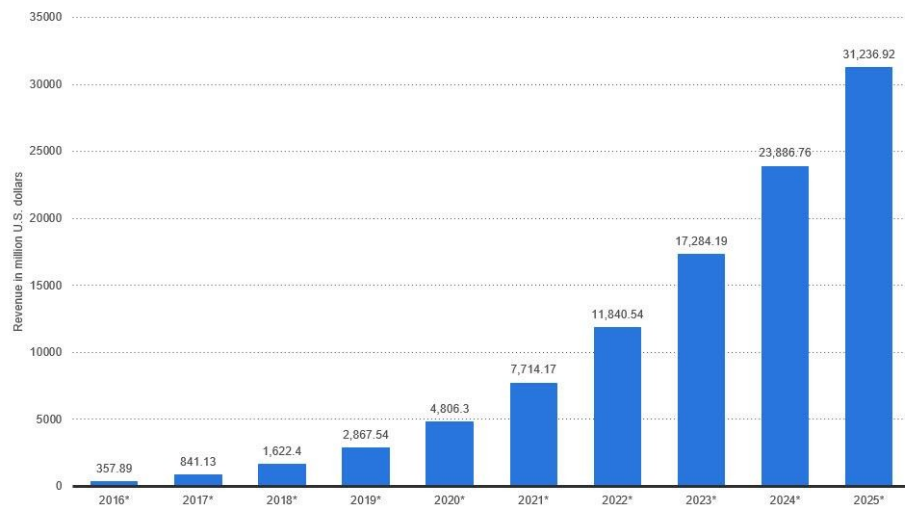
## Industries Targeted by ML App Developers



# Contexto

Enterprise artificial intelligence market revenue worldwide 2016-2025

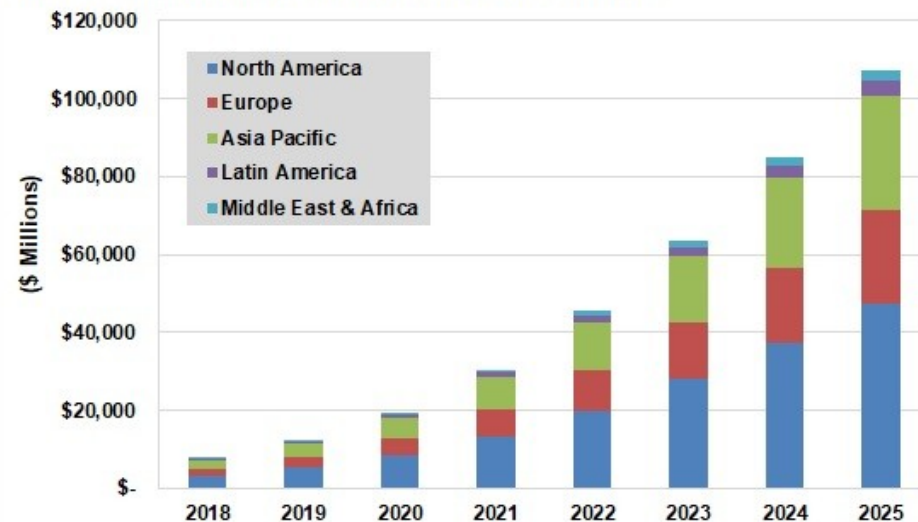
**Revenues from the artificial intelligence for enterprise applications market worldwide, from 2016 to 2025 (in million U.S. dollars)**



statista



**Enterprise AI Revenue by Region, World Markets: 2018-2025**

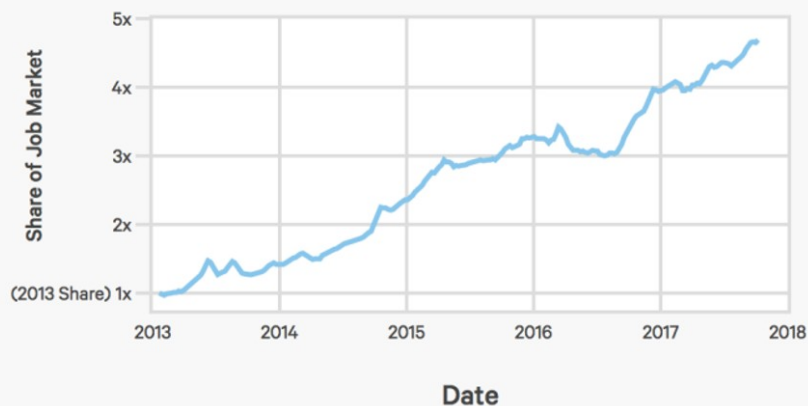


Source: Tractica

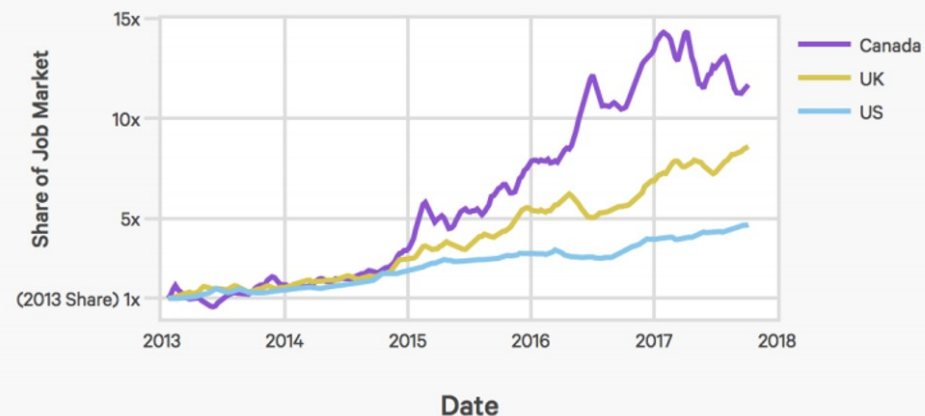


# Contexto

Share of US Jobs Requiring AI Skills (Indeed.com)



Share of Jobs Requiring AI Skills (Indeed.com)



Sources: Indeed.com

AIINDEX.ORG

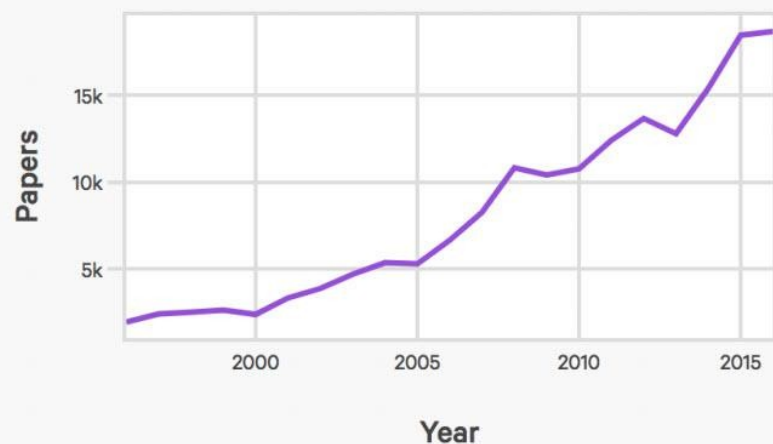
Source: Indeed.com

AIINDEX.ORG



# Contexto

Annually Published AI Papers



Source: Scopus.com

AIINDEX.ORG 

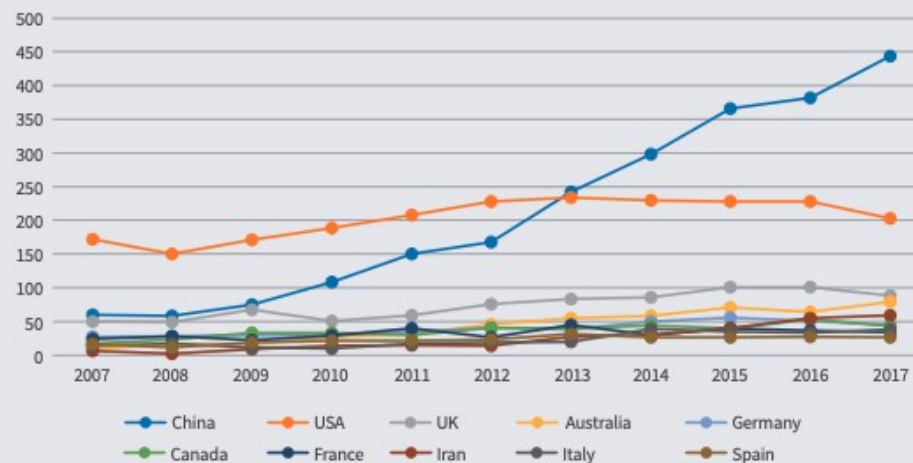


Figure 2-12 Trends of the output of highly cited AI papers of the top 10 countries

# Contexto

## Make AI Impact Measurable (Somehow) and Support Corporate Objectives



Percentage of Respondents, n = 78

Base: Gartner Research Circle Members who currently deployed/are deploying in the next 0-12 Months; Excluding "Unsure"

Source: 2018 Gartner AI and Machine Learning Development Strategies Study

Q: What is the primary measure that your organization is currently using/planning to use to determine the success of its AI or ML initiatives? Select all that apply.

Source: ["Assign Metrics About Value, Lessons and Scale to Your Early AI Projects"](#) (G00383486)

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Gartner

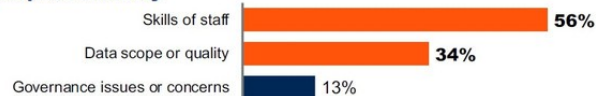
# Contexto

## Top Hurdles:

1. Skills of staff
2. Understanding the benefits and uses
3. Data

### Top 3 Challenges to AI/ML Adoption

#### Enterprise maturity



#### Fear of unknown



#### Finding a starting point



#### Vendor strategy

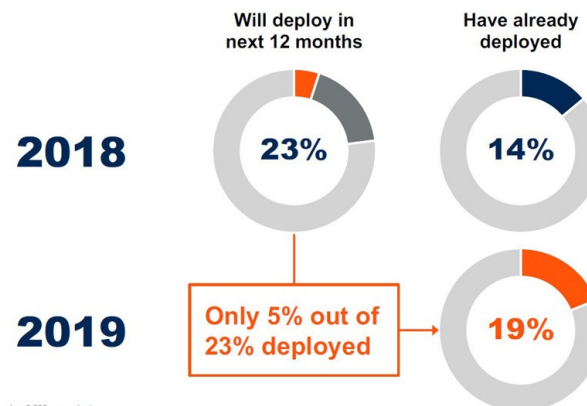


Gartner.

Percentage of Respondents, Sum of 1-3 rank  
Base: n=106 Gartner Research Circle Members; Excluding "Not sure"  
Q2: What are the top 3 challenges or barriers to the adoption of AI and ML within your organization? Please rank up to 3.

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## Where AI Adoption Stands and Where It's Stalled



Base: All Answering, 2,852 respondents

Source: Gartner 2019 CIO Survey

Base: All Answering, 1,063 respondents

Source: Gartner 2020 CIO Survey

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Gartner.



- Ok, ok, já deu para entender que essa tal de IA e Machine Learning devem ser importantes...

# Objetivos do módulo

- Conhecer os principais conceitos de Inteligência Artificial e Machine Learning
- Conhecer as principais classes de algoritmos em ML
- Aprender como desenvolver modelos de ML em ferramentas de AutoML
  - ~ BigML\*, Weka e Orange

# Conteúdo

- Inteligência Artificial e Machine Learning
- Data Science e Big Data
- Classes de algoritmos em ML
- Ferramentas de AutoML
- Preparação de dados
- Algoritmos supervisionados
  - ~ Árvores de decisão, ensembles e random forests
  - ~ Regressões e time series
  - ~ Redes neurais e deep learning

# Conteúdo

- Algoritmos não-supervisionados
  - ~ Clusterização
  - ~ Detecção de anomalias
  - ~ Descoberta de associações
  - ~ Análise de textos (topic models)
- Principal Component Analysis
- Estudos de caso



# Ferramentas

- BigML

~ [www.bigml.com](http://www.bigml.com)



- Weka

~ <https://www.cs.waikato.ac.nz/ml/weka/>



- Orange

~ <https://orange.biolab.si/>





# Obrigado

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