# Data Science as a Team Sport

**Gabriela de Queiroz**
@gdequeiroz | linktr.ee/gdq

slides: **bit.ly/eusr20**

Image: www.freepik.com/vectors/people

# Hi, I'm Gabriela de Queiroz

**Sr. Machine Learning Manager, IBM**

- Founder of **R-Ladies** (rladies.org)
- Founder of **AI Inclusive** (ai-inclusive.org)
- Member of the **R Foundation** (r-project.org)

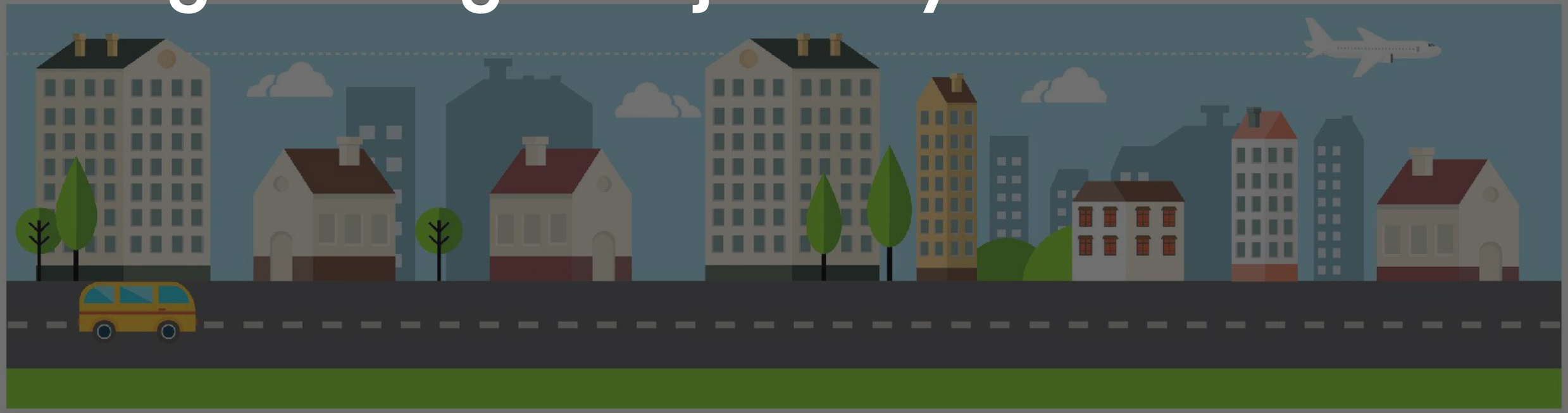
- B.S. in Statistics
- MSc. in Epidemiology
- MSc. in Statistics

Data Scientist + Developer Advocate + Open Source Developer + Manager +

Statistician + Epidemiologist + Community Builder + Mentor + Speaker + Educator

slides: bit.ly/eusr20

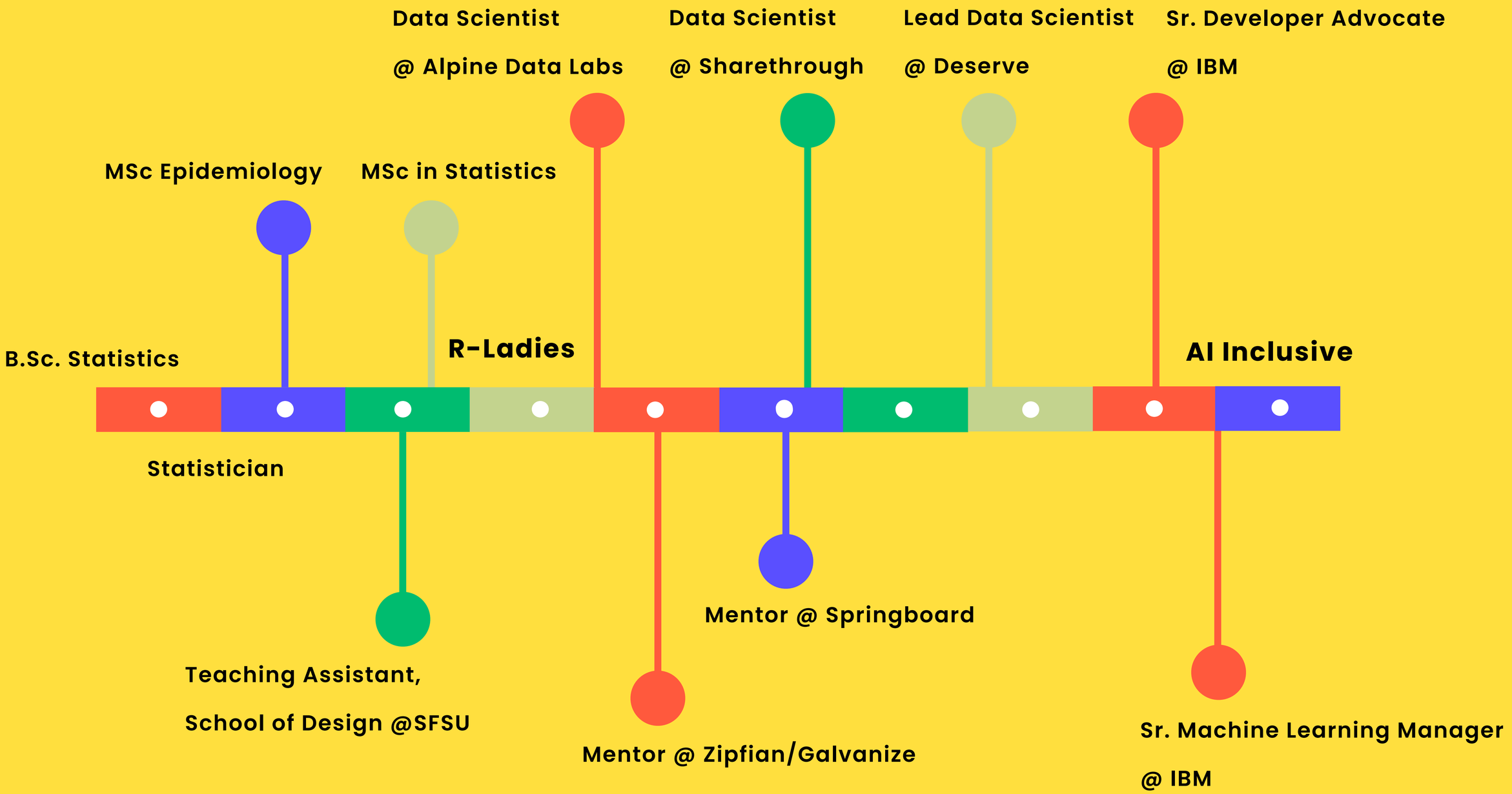
# Let’s go through the journey




Population: ~200 million

Official Language: Portuguese


Population: ~6 million


Data Scientist
@ Alpine Data Labs
Data Scientist
@ Sharethrough
Lead Data Scientist
@ Deserve
Sr. Developer Advocate
@ IBM
MSc Epidemiology
MSc in Statistics
B.Sc. Statistics
R-Ladies
AI Inclusive
Statistician
Teaching Assistant,
School of Design @SFSU
Mentor @ Springboard
Mentor @ Zipfian/Galvanize
Sr. Machine Learning Manager
@ IBM

It was founded in October 2012.

The idea was to give back to the community and create a place where people would feel comfortable, safe and welcome.

A place where people could ask questions, learn together and share.

31 OCT

Wednesday, October 31, 2012

## Introduction to R (beginners and pre-beginners)

Hosted by
**Gabriela de Queiroz**

### Details

Hello R-ladies!

The first meetup will take place on October 31st at the Google office in San Francisco.

For this first meetup, we'll do an introduction to R. We'll go over the following topics:

installing R setting up an R environment (RStudio) basic commands (open files, simple dataset manipulation, simple plots, etc) loading packages the help function and how to read its output

All you need is your laptop and charger.

We look forward to seeing you!

# R-Ladies

rladies.org

54
R-Ladies Countries

193
R-Ladies Cities

71618
R-Ladies members on meetup.com

Worldwide organization that promotes diversity in the R community via meetups and mentorship in a friendly and safe environment


# AI Inclusive

> Together, we are building a community to make **AI** more **inclusive** to everyone.

**Mission:** Increase the representation and participation of minority groups in Artificial Intelligence

- Website: ai-inclusive.org
- Twitter: bit.ly/ai-inclusive-twitter
- Facebook: bit.ly/ai-inclusive-facebook
- Instagram: bit.ly/ai-inclusive-instagram
- Youtube: bit.ly/ai-inclusive-youtube




If you want to start a chapter, send us an email: info@ai-inclusive.org

# Researcher/Statistician

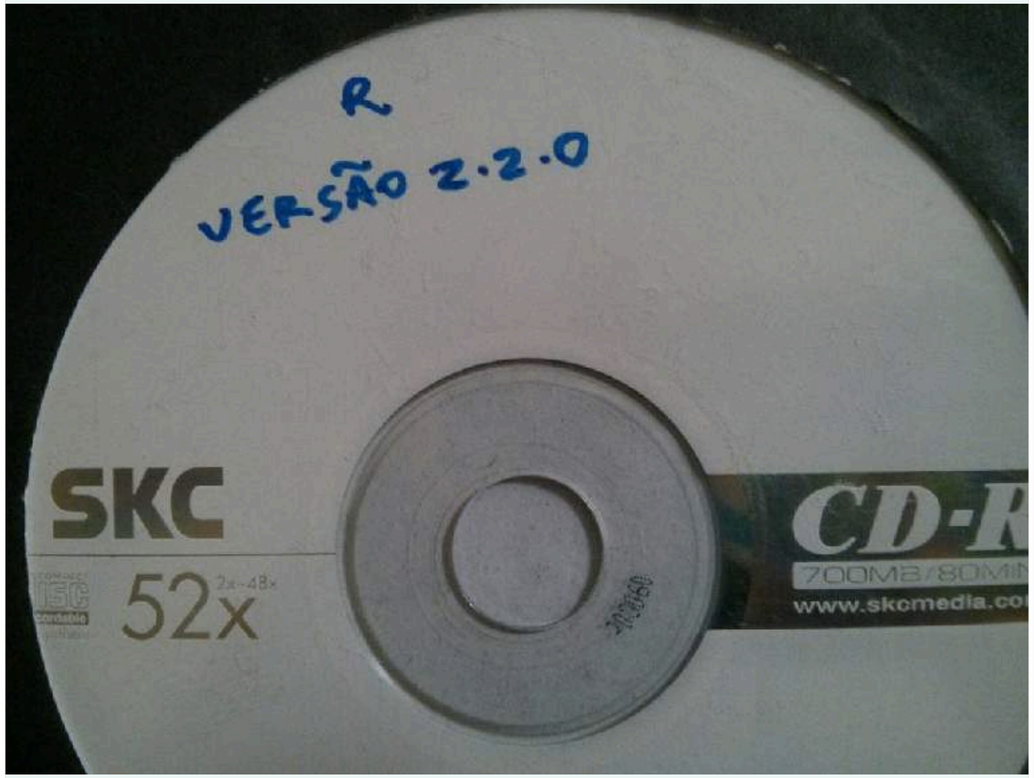
## Undergraduate

- STATE UNIVERSITY
- PUBLIC AND FREE UNIVERSITY
- **BACHELOR IN STATISTICS**

## Grad School

- SCIENTIFIC INSTITUTION FOR RESEARCH
- PUBLIC AND FREE
- **MSC. IN EPIDEMIOLOGY**

# ❤️ First exposure to R ❤️




R 2.2.0 (October, 2005)

R 3.1.0 (April, 2014)
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R 2.6.0 (October, 2007)
R 2.5.1 (July, 2007)
R 2.5.0 (April, 2007)
R 2.4.1 (December, 2006)
R 2.4.0 (October, 2006)
R 2.3.1 (June, 2006)
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R 2.2.0 (October, 2005)

R 4.0.3 (October, 2020)
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R 3.2.3 (December, 2015)
R 3.2.2 (August, 2015)
R 3.2.1 (June, 2015)
R 3.2.0 (April, 2015)
R 3.1.3 (March, 2015)
R 3.1.2 (October, 2014)
R 3.1.1 (July, 2014)

The R Inferno

Patrick Burns[1]

30th April 2011

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3 Failing to Vectorize
3.1 Subscripting
3.2 Vectorized if
3.3 Vectorization impossible

4 Over-Vectorizing

An Introduction to R

Notes on R: A Programming Environment for Data Analysis and Graphics
Version 2.5.1 (2007-06-27)

W. N. Venables, D. M. Smith
and the R Development Core Team

1 Introduction and preliminaries
1.1 The R environment
1.2 Related software and documentation
1.3 R and statistics
1.4 R and the window system
1.5 Using R interactively
1.6 An introductory session
1.7 Getting help with functions and features
1.8 R commands, case sensitivity, etc.
1.9 Recall and correction of previous commands
1.10 Executing commands from or diverting output to a file
1.11 Data permanency and removing objects

2 Simple manipulations; numbers and vectors
2.1 Vectors and assignment
2.2 Vector arithmetic
2.3 Generating regular sequences
2.4 Logical vectors
2.5 Missing values
2.6 Character vectors
2.7 Index vectors; selecting and modifying subsets of a data set
2.8 Other types of objects

3 Objects, their modes and attributes
3.1 Intrinsic attributes: mode and length
3.2 Changing the length of an object
3.3 Getting and setting attributes
3.4 The class of an object

4 Ordered and unordered factors

HEI

HEALTH EFFECTS INSTITUTE

# STATEMENT

Synopsis of Research Report 171

## Multicity Study of Air Pollution and Mortality in Latin America (the ESCALA Study)

### BACKGROUND

For nearly two decades, scientists seeking to understand the role that air pollution might play in population health effects have relied heavily on epidemiologic studies known as time-series studies. Time-series studies use information on daily changes in air pollutant concentrations and daily counts of mortality and morbidity. Although initially conducted at the individual city level, coordinated analyses across many cities have recently emerged as the tool of choice for developing more reliable and comparable estimates of the short-term effects of air pollution on health in regions around the world. HEI has a long-standing interest in these coordinated analyses; it has funded studies such as the National Morbidity, Mortality, and Air Pollution Study; Air Pollution and Health: A European and North American Approach; and Public Health and Air Pollution in Asia.

The present study, referred to hereafter by its Spanish acronym ESCALA (Estudio de Salud y Contaminación del Aire en Latinoamérica), was initiated to address underlying data and methodologic limitations in the epidemiologic literature on the health effects of air pollution in Latin America that had been identified in a 2005 review by the Pan American Health Organization. The William and Flora Hewlett Foundation, which has a strong interest in understanding air pollution and health in Latin America, provided HEI with supplemental support to address gaps in the evidence necessary to inform regulatory decisions, and in the process to build a network of health experts capable of carrying out research on air pollution in the future. The multicenter study was led by Dr. Isabelle Romieu, then at the Instituto Nacional de Salud Pública in México, in collaboration with Dr. Nelson Gouveia in Brazil and Dr. Luis Cifuentes in Chile.

### APPROACH

The primary objective of the ESCALA study was to estimate the effect of daily exposures to $PM_{10}$ (particulate matter ≤ 10 µm in aerodynamic diameter) and to ozone on daily mortality from several causes (all natural causes, cardiopulmonary disease, respiratory disease, cardiovascular disease, cerebrovascular–stroke, and chronic obstructive pulmonary disease) and for several age groups (all-age, ≥ 65 years, < 1 year, 1–4 years, 1–14 years) in nine Latin American cities, and for the region as a whole, using a common analytic framework. The nine cities were Monterrey, Toluca, and Mexico City in México; Rio de Janeiro, São Paulo, and Porto Alegre in Brazil; and Santiago, Concepción, and Temuco in Chile. Of these, three cities (Porto Alegre, Concepción, and Temuco) were excluded from the ozone analyses because of the lack of adequate ozone monitoring data.

In the first stage of the analyses, the investigators estimated the percentage change in the risk of mortality per 10-µg/m$^3$ increase in $PM_{10}$ or ozone for each combination of age group and cause of death for the individual cities in each country. They followed a common protocol for fitting the widely used Poisson regression models to the air pollution and mortality time-series data in each city while controlling for other factors that might also explain the temporal patterns of mortality (e.g., temperature, humidity, season, day-of-the-week, holidays). The investigators also carried out analyses to test the sensitivity of the results to various details of the models. Ultimately, the final models used in the individual cities were chosen to fit specific patterns of mortality in those cities.

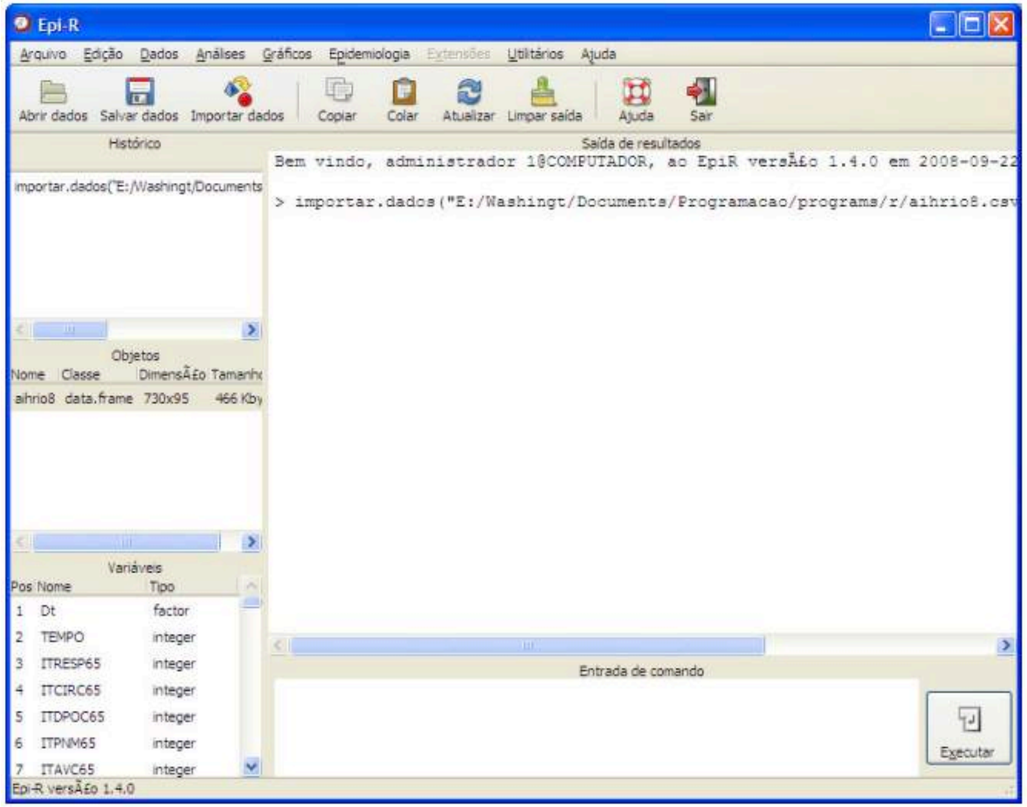
With the individual city data, the investigators also explored two-pollutant models, in which $PM_{10}$ results were controlled for the presence of ozone and vice versa; whether the association of ozone with mortality differed by warm and cold season;

This Statement, prepared by the Health Effects Institute, summarizes a research project funded by HEI and conducted by Dr. Isabelle Romieu, at the Instituto Nacional de Salud Pública, Morelos, México, and colleagues. The complete report, *Multicity Study of Air Pollution and Mortality in Latin America (the ESCALA Study)* (© 2012 Health Effects Institute), can be obtained from HEI or our Web site (see last page).



Epi-R

# A graphic user interface oriented to epidemiological data analysis



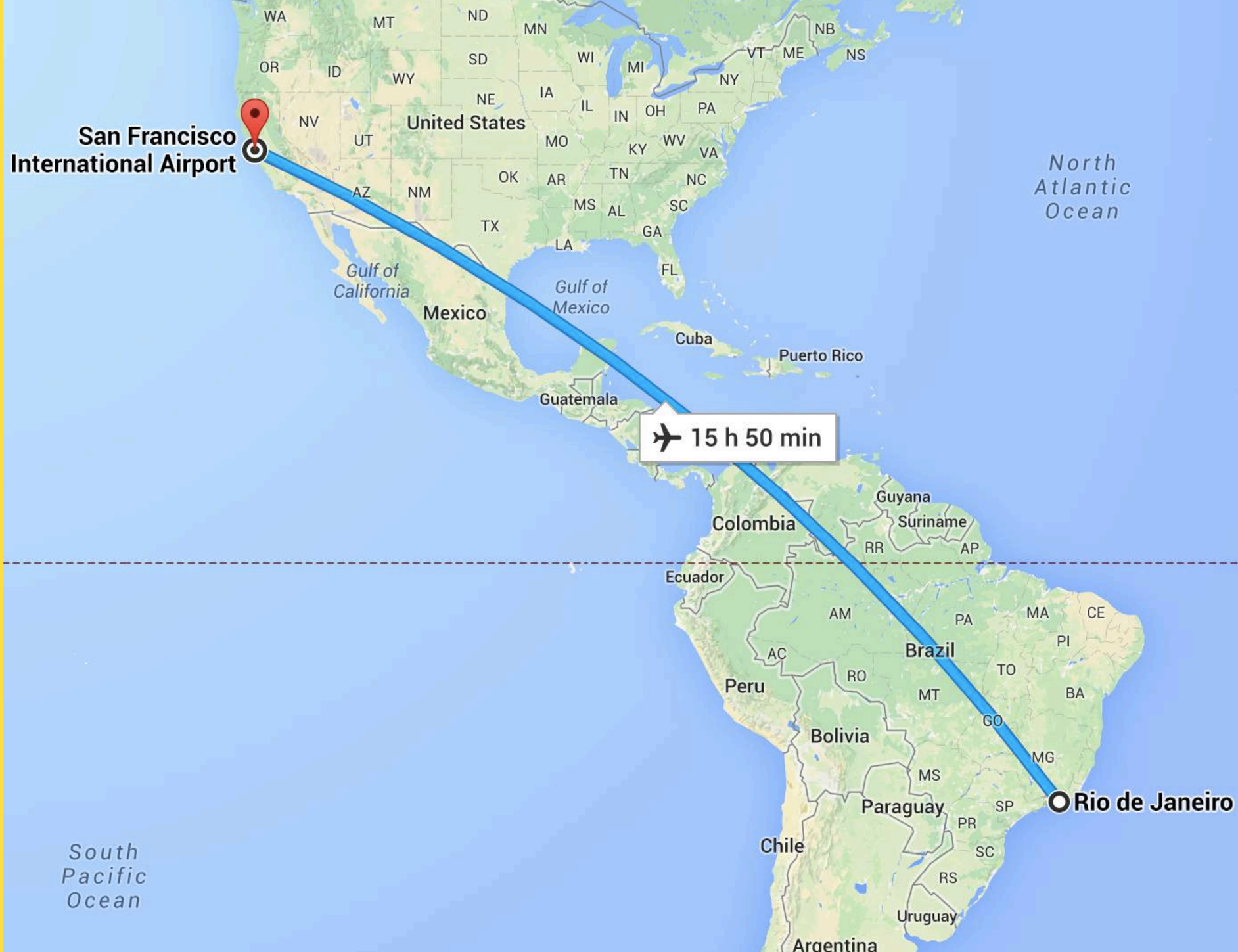

slides: bit.ly/eusr20

# 2012

# Rio de Janeiro

# ››››

# San Francisco

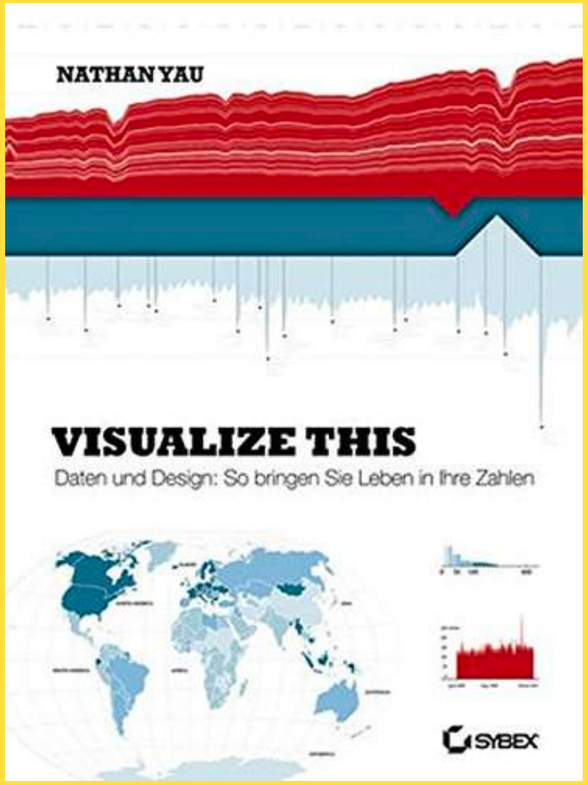


My name is Pino Trogu and I teach a Data Visualization class in the Fall at San Francisco State University. I come from a design background and I have played a little bit with coding. This semester I will be using Visualize This by Nathan Yau as the class textbook. The majority of examples are done using R and I am looking for TAs to help me with the R exercises described in the book and maybe with a little bit of javascript.

The class is really an introduction to data visualization with emphasis on best design practices.

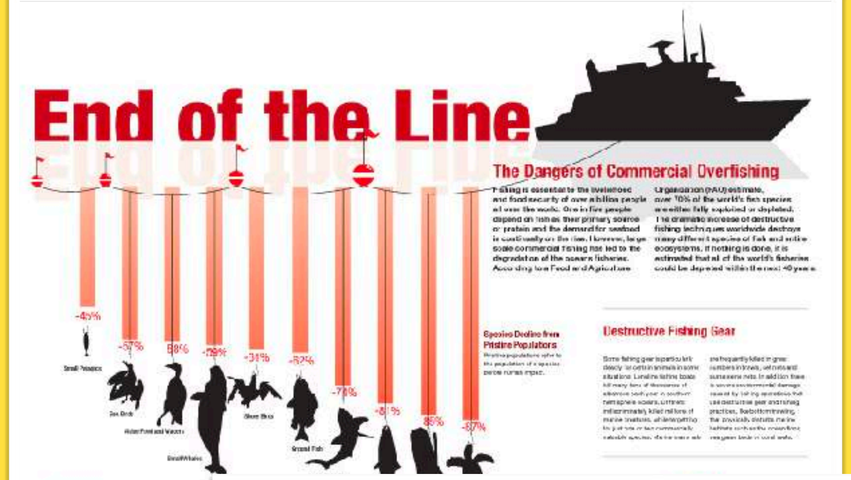
This Fall I teach two sections on M/W afternoons and evenings.

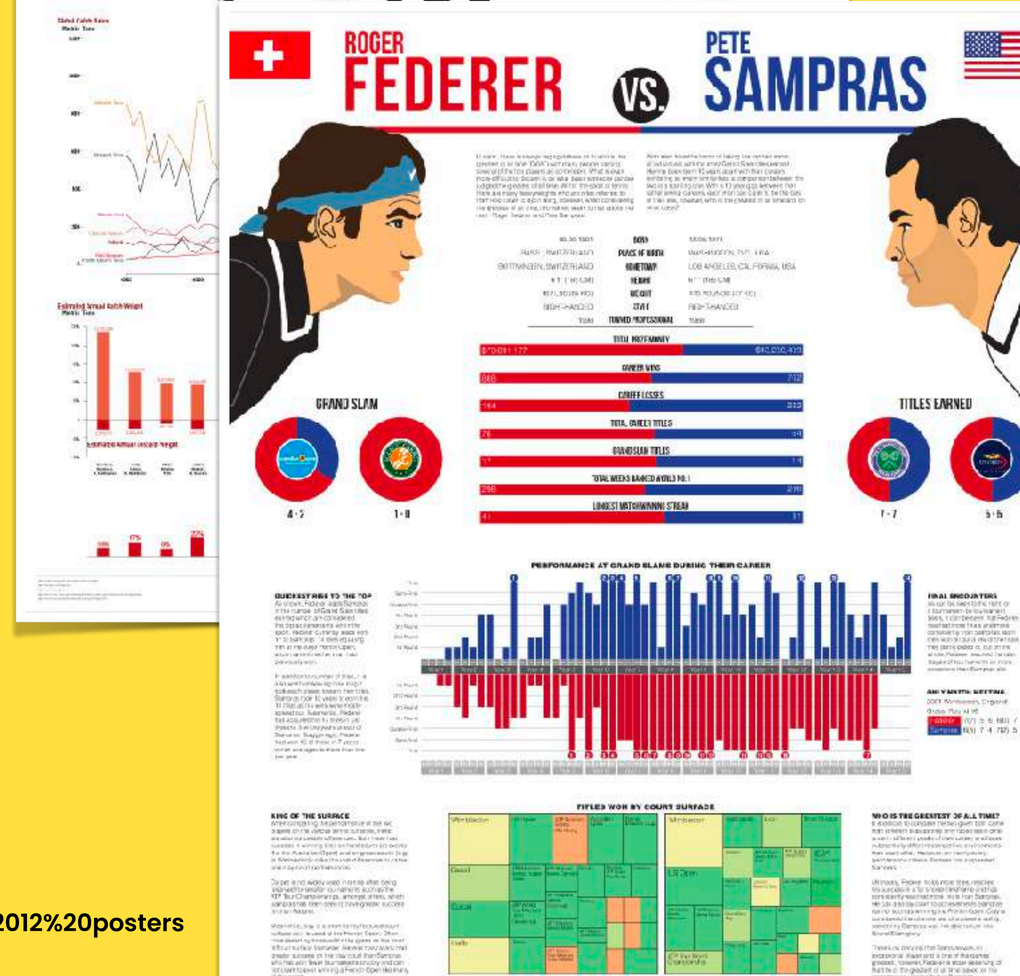
R seems great as a base for graphics that can then be finalized with Illustrator for print-based publication. Last year we worked a bit with D3 which I think has a steeper learning curve, and is more geared to interaction and animation. Of course anyone with some knowledge of D3 and javascript in general would be great for this also.




**Teaching Assistant**

**School of Design @SFSU**



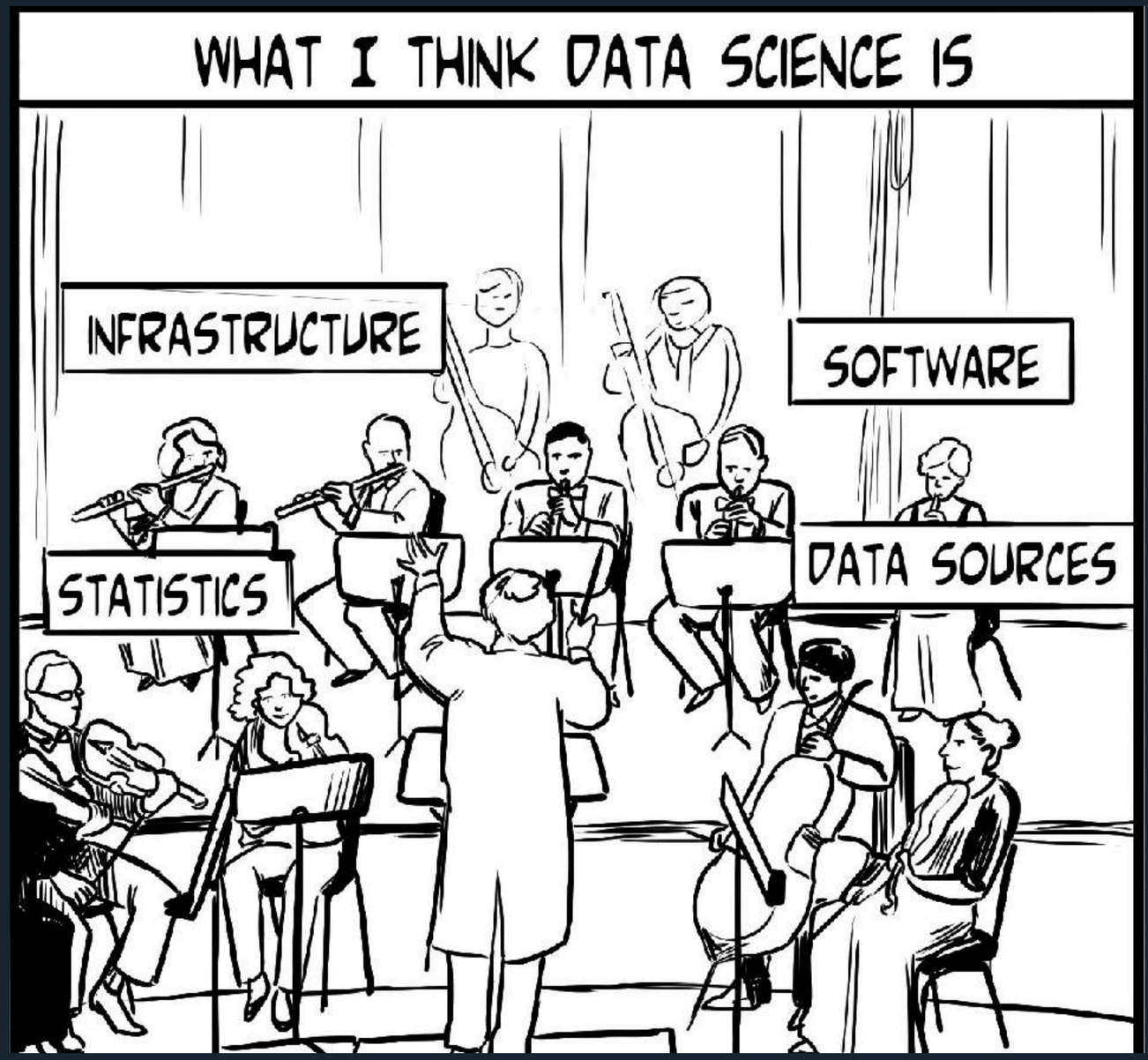

**You can find more:**
**http://523informationdesign.blogspot.com/search/label/2012%20posters**

# The Data Science Career

# What is Data Science?


slides: bit.ly/eusr20

# What is Data Science?



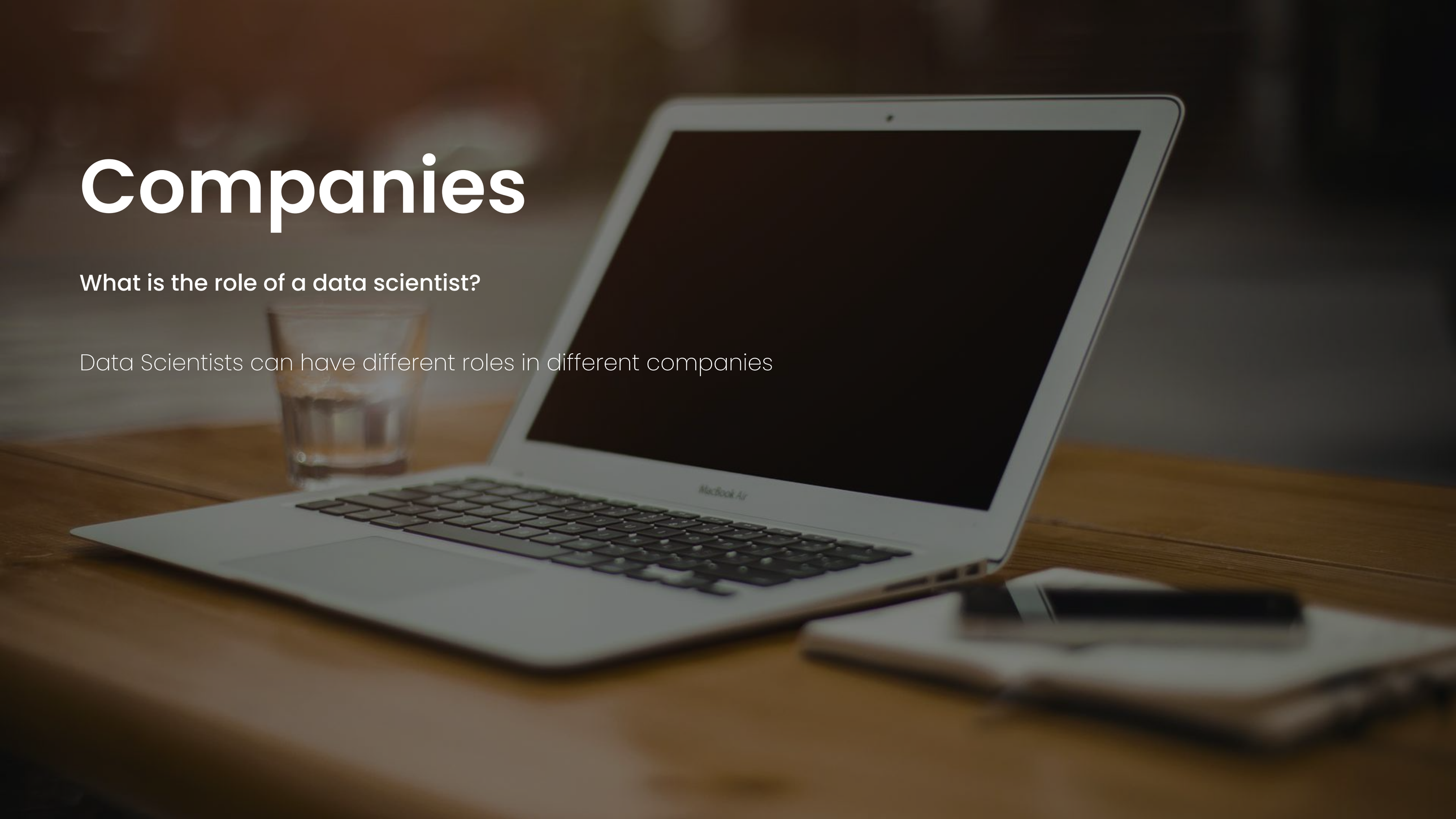

slides: bit.ly/eusr20


Data Scientists are adaptable and
flexible professionals

# Companies

**What is the role of a data scientist?**

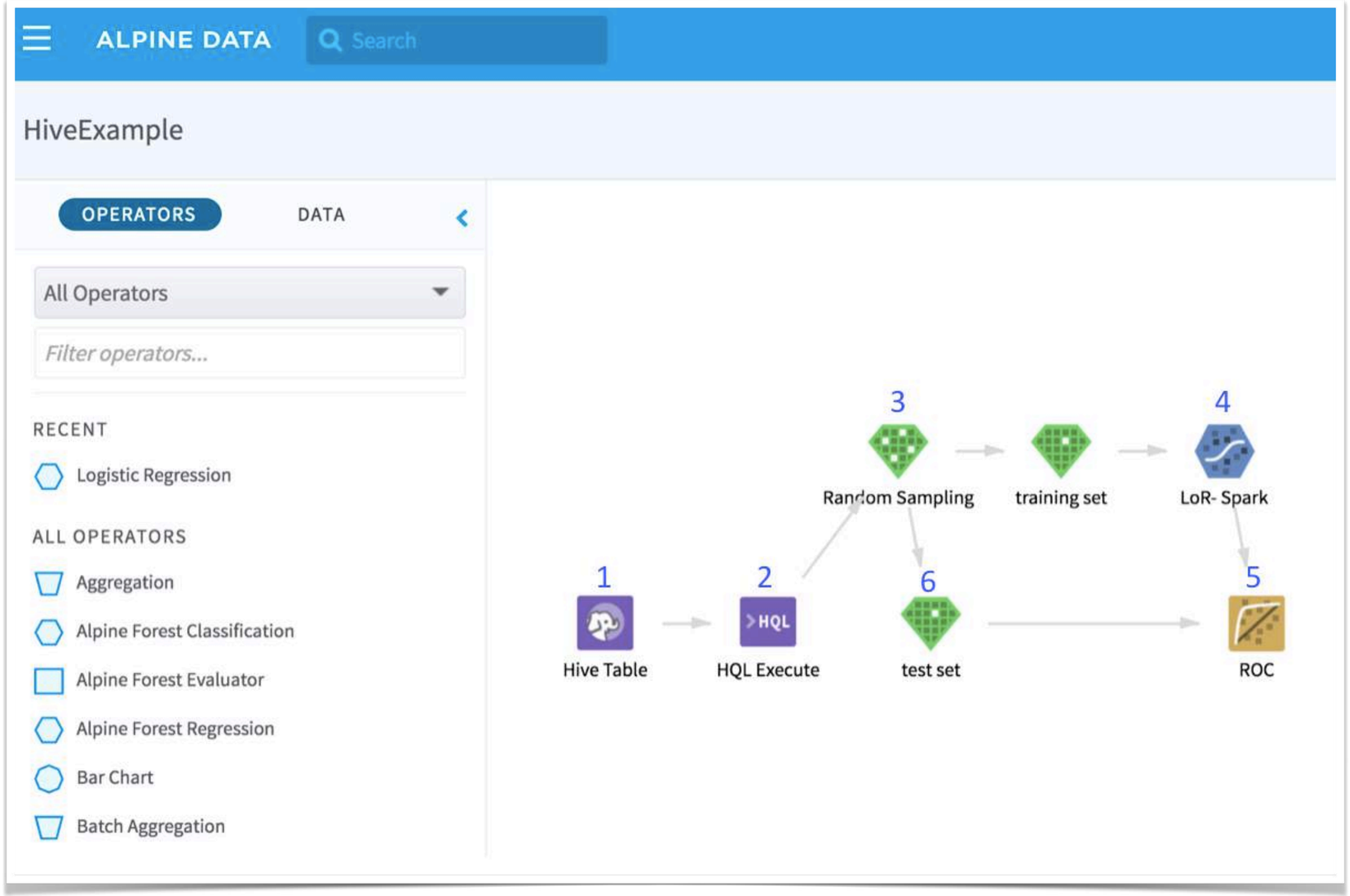
Data Scientists can have different roles in different companies



# Advanced Analytics Platform for Big Data

ALPINE DATA™

Empowers business users to define and participate in data science projects and gives data scientists the tools they need to create value from data

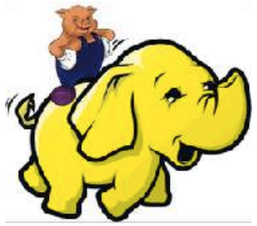


## Company Numbers

- **40** Employees
- **10** Engineers
- **5** Data Scientist

## Tool



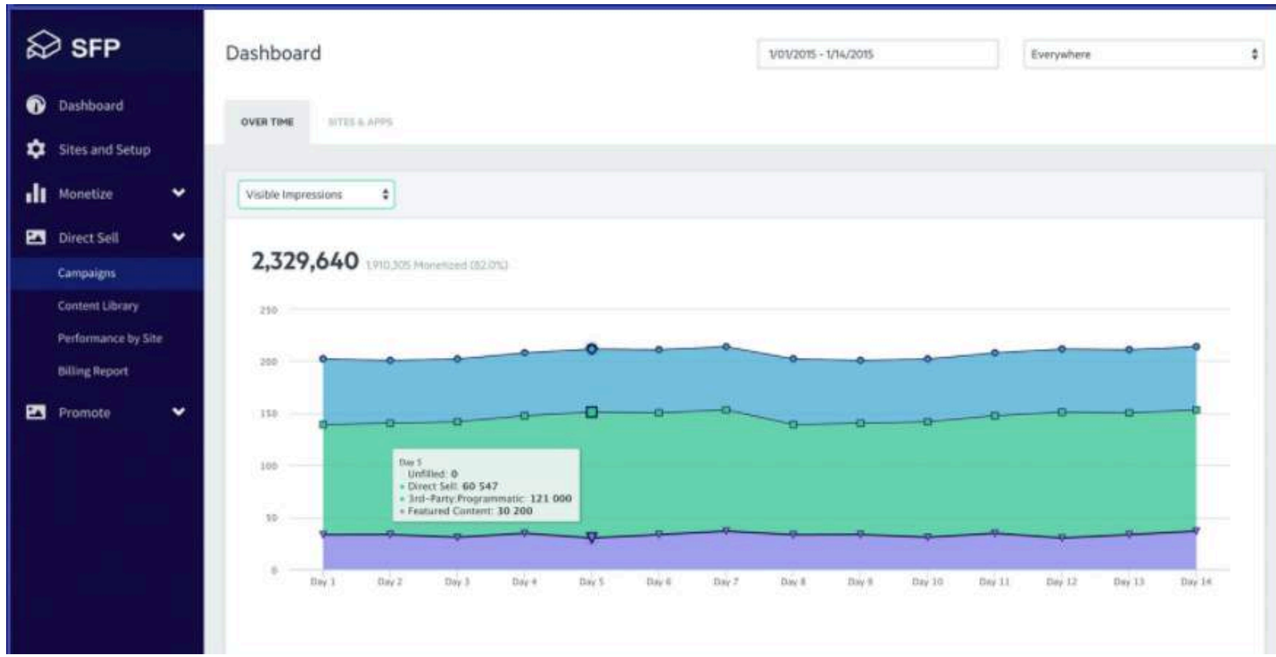


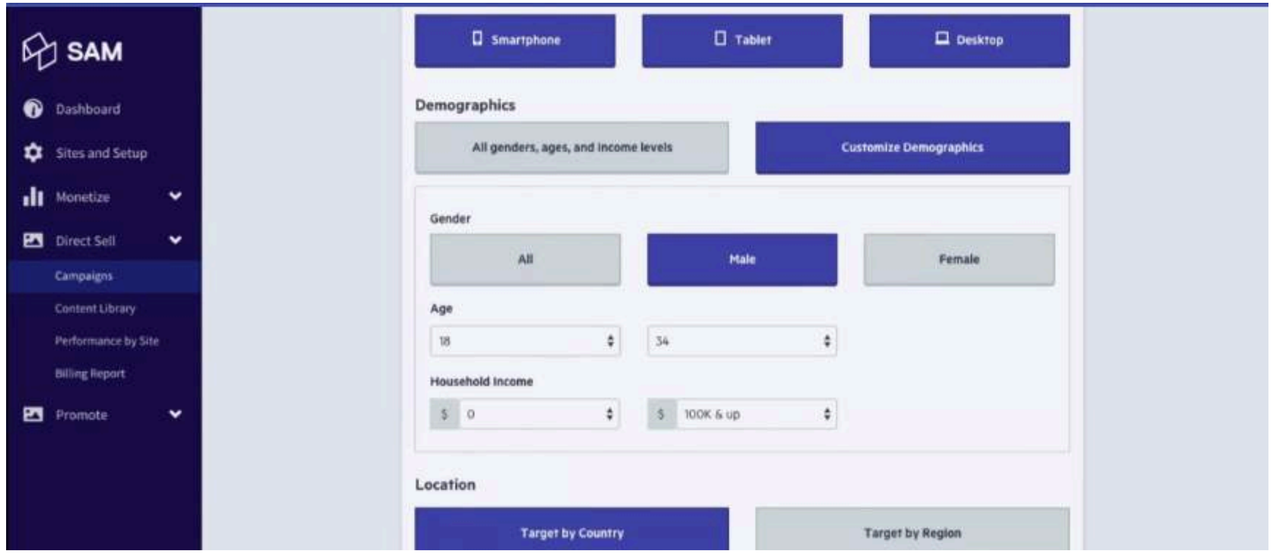
## Key Responsibilities:

- Consultant
- Write Documentation
- Train Customers
- Prioritization

# Native Advertising software for publishers, app developers & advertisers.

sharethrough

## Company Numbers

- **150** Employees
- **20** Engineers
- **1** Data Scientist

## Tool












## Key Responsibilities:

**Infrastructure**

**Models / Optimization**

**Experimental Design**

**Education**

# Credit Card designed for Generation Z

(INCLUDING INTERNATIONAL STUDENTS)


Through machine learning and alternative data, Deserve is helping millennials and Gen Z's, the next wave of credit owners, gain financial independence through access to fair credit products.

## Company Numbers

- **35** Employees
- **7** Engineers
- **4** Data Scientist

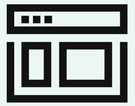
## Tool





## Key Responsibilities:

Infrastructure



Dashboard

R packages

Models

Open Source @ IBM

# CODAIT

Center for Open Source Data
and AI Technologies

## Open Source,  Data & AI Technologies

## Company Numbers

- **+300k** Employees
- **?** Engineers
- **?** Data Scientist

## Tool

python™

docker

R

## Key Responsibilities:

## Senior Open Source Developer - DL/ML/AI Developer and Advocate

# Key Responsibilities:

1) Write great code in key open source communities
2) Democratize AI by building tools, launching new open source projects, and improving existing ones
3) Gain eminence in the community by socializing your work, and speaking at events
4) Work with offering managers and product teams on applications
5) Guide and mentor clients to become self-sufficient open source developers
6) Be authentic; mentor others, and be open to mentoring by others
7) Read and comment on more code than you write; fix bugs, test cases, and documentation
8) Etc ...

# Sr. Machine Learning Manager

## Responsibilities: (MANY!)

**MACHINE LEARNING TEAM**

10 open source developers

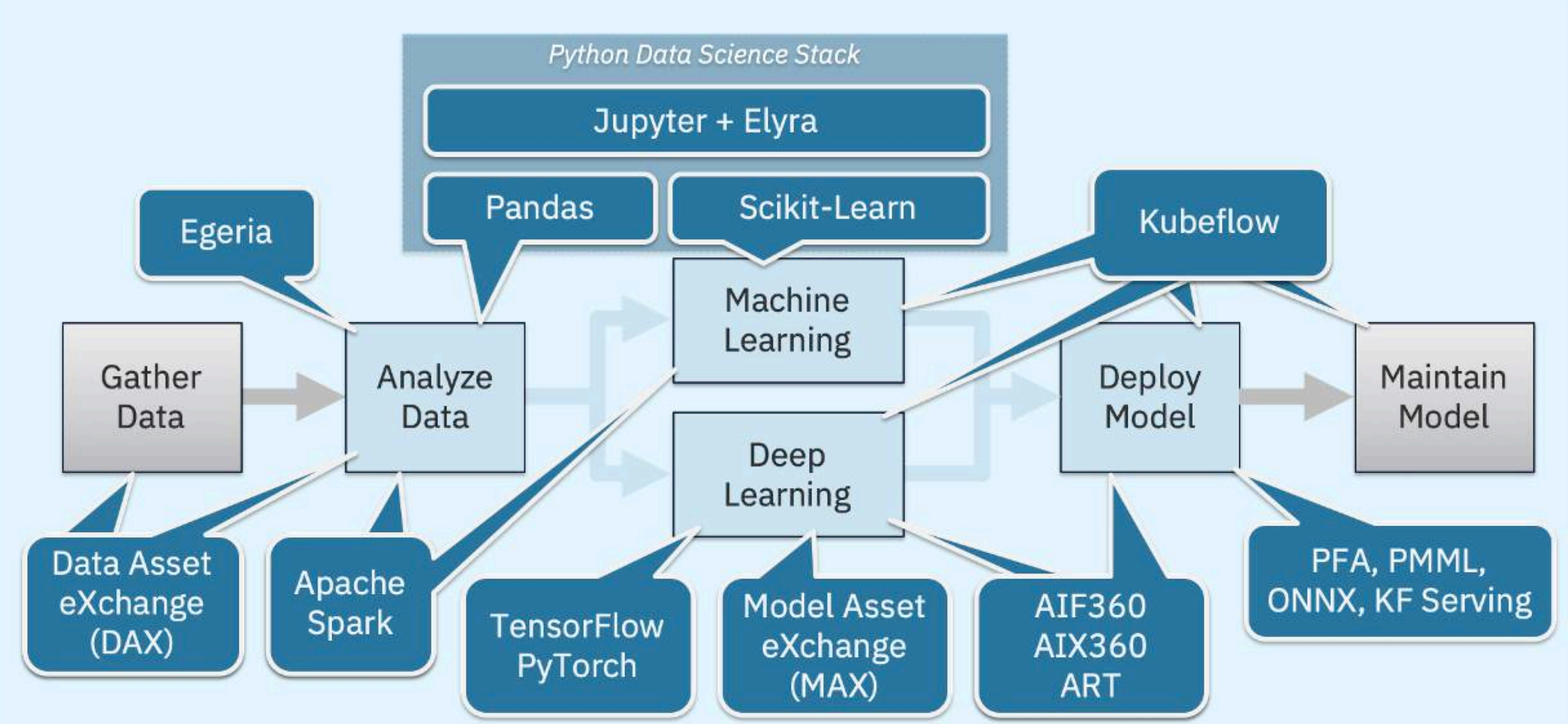
- Data Scientists
- Software Engineers

>> Backgrounds in Stats, Math, Engineering, Computer Science, Finance.

| PST | Sun 3/22 | Mon 3/23 | Tue 3/24 | Wed 3/25 | Thu 3/26 | Fri 3/27 | Sat 3/28 |
|---|---|---|---|---|---|---|---|
| 9am | | 9 – 10 Meeting with X Team | 9 – 10 Meeting with X Team | 9 – 10 Meeting with Z Team | 9 – 10 Meeting with X Team | 9 – 10 Sprint Retrospective | |
| 10am | | 10 – 11 Project Planning Session | 10 – 11 Press Interview | 10 – 11 Project Planning Session | 10 – 11 Corporate Event update | 10 – 11 Project Planning session | |
| 11am | | 11 – 12p Call with East Coast office | 11 – 12:30p Presentation to executive team | 11 – 12p Coaching session | 11 – 12p Presentation to Mobile team | 11 – 12:30p Training session | |
| 12pm | | 12p – 1p Management Luncheon | 12:30p – 1:30p Call with Tony | 12p – 1p Lunch with CEO | 12p – 1p Team Lunch | 12:30p – 1:30p Conference Call | |
| 1pm | | 1p – 2p 1 on 1 with Tony | 1:30p – 3p White Board session with Antoine | 1p – 2p Project Z Meeting | 1p – 2p 1 on 1 with Chris | 1:30p – 2:30p Project Z Meeting | |
| 2pm | | 2p – 3p Review session | | 2p – 3p 1 on 1 with Amanda | 2p – 3p 1 on 1 with Tara | 2:30p – 3:30p Check in with Rich | |
| 3pm | | 3p – 5p Leadership team planning session | 3p – 4p Meeting with Design team | 3p – 5p Company All Hands | 3p – 4p Meeting with engineering | 3:30p – 5p Senior leadership checkin | |
| 4pm | | | 4p – 5p HR Mandated training | | 4p – 5p New project Kickoff | | |
| 5pm | | 5p – 6p Call with Australia office | 5p – 6p Drinks with Thomas | 5p – 6p Leadership Team Dinner | 5p – 6p Speak at Event | 5p – 6p Team happy hour | |
| 6pm | | | | | | | |

# We build tools to make AI accessible and available to everybody

(codait.org)




We contribute to and advocate for the **open-source** technologies

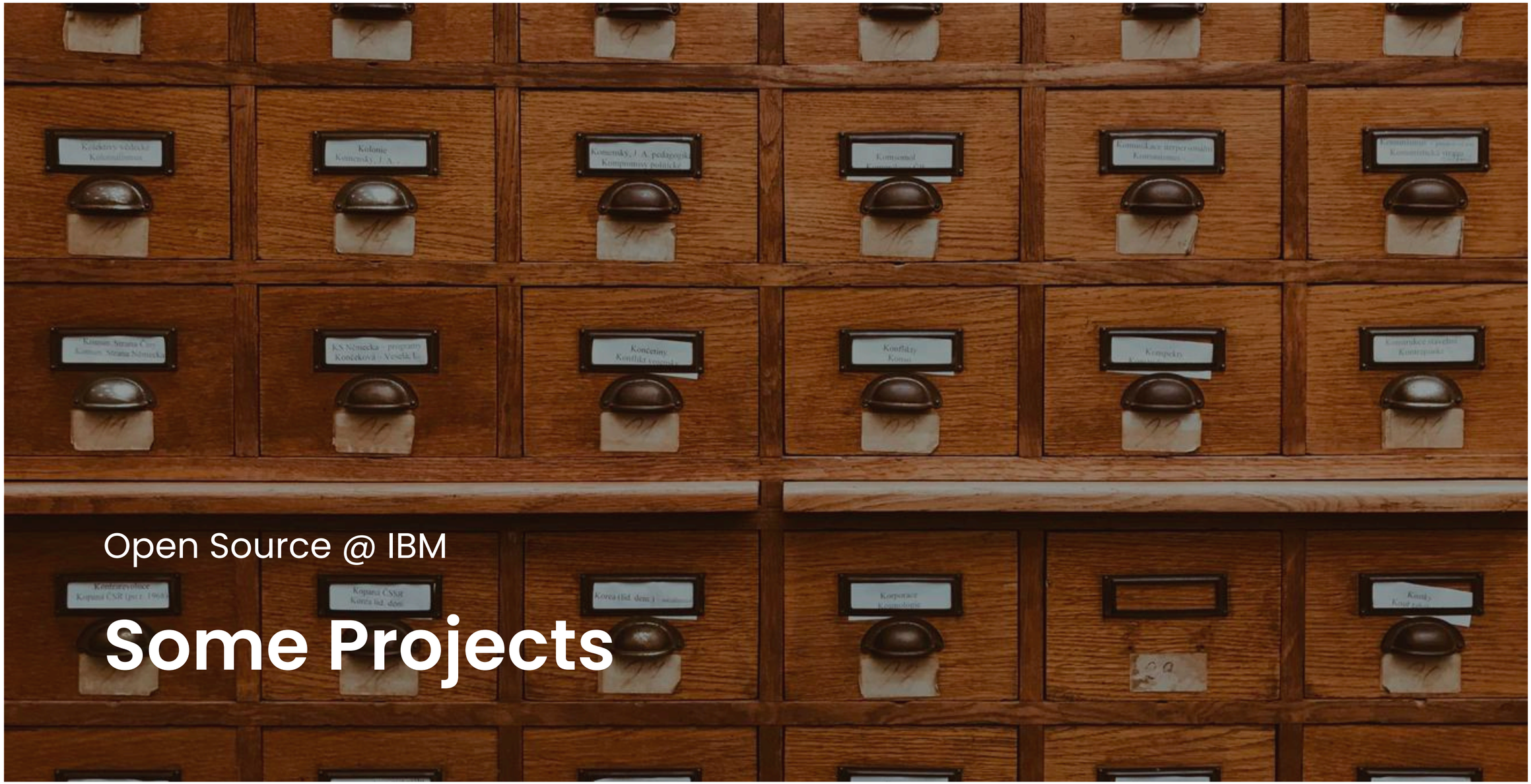
codait.org

# What is Open Source?

- The term open source refers to something people can modify and share because its design is publicly accessible

- Open source software (OSS) is software with source code that anyone can inspect, modify, and enhance user problems and help you achieve your business goals.

https://opensource.com/resources/what-open-source

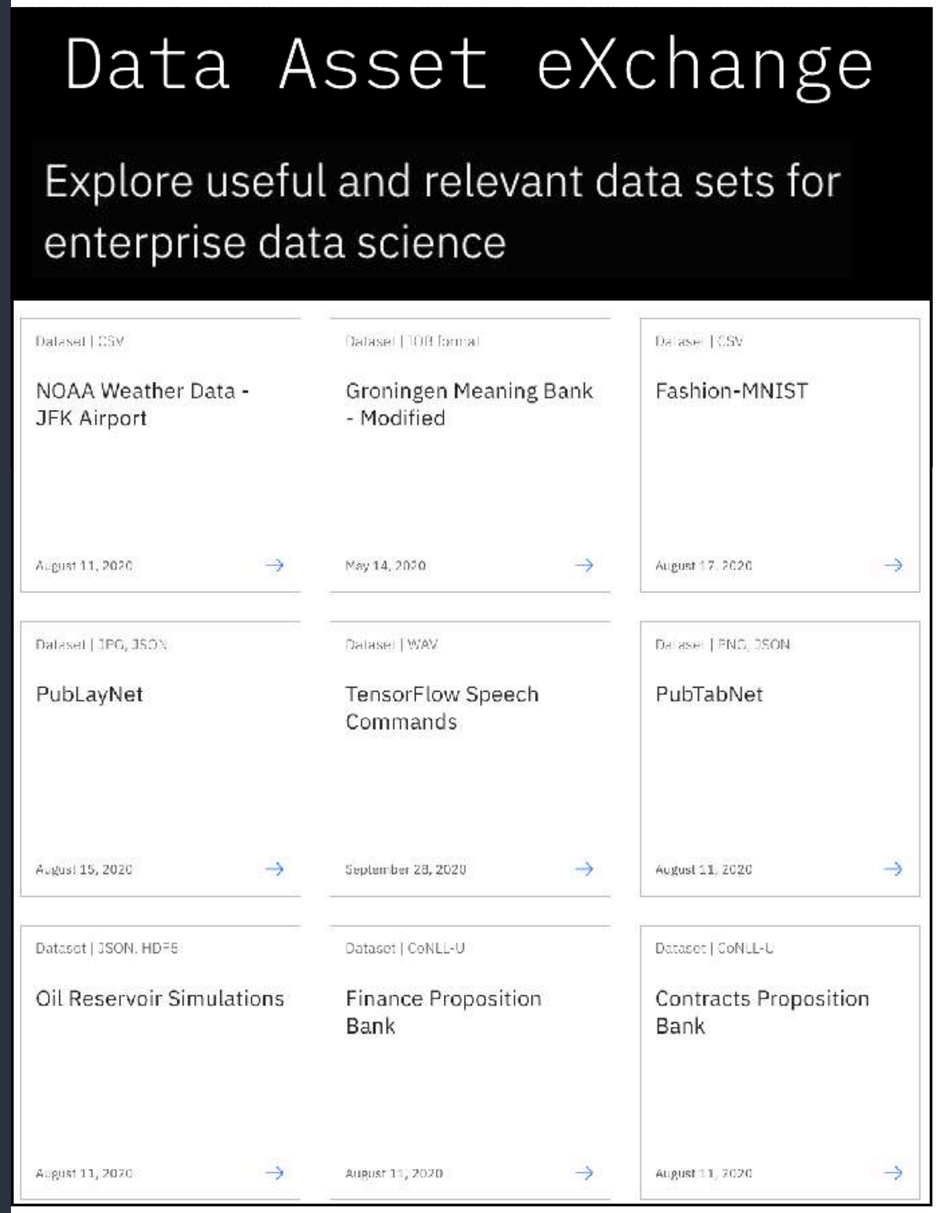


Open Source @ IBM

# Some Projects

# Data Asset eXchange (DAX)

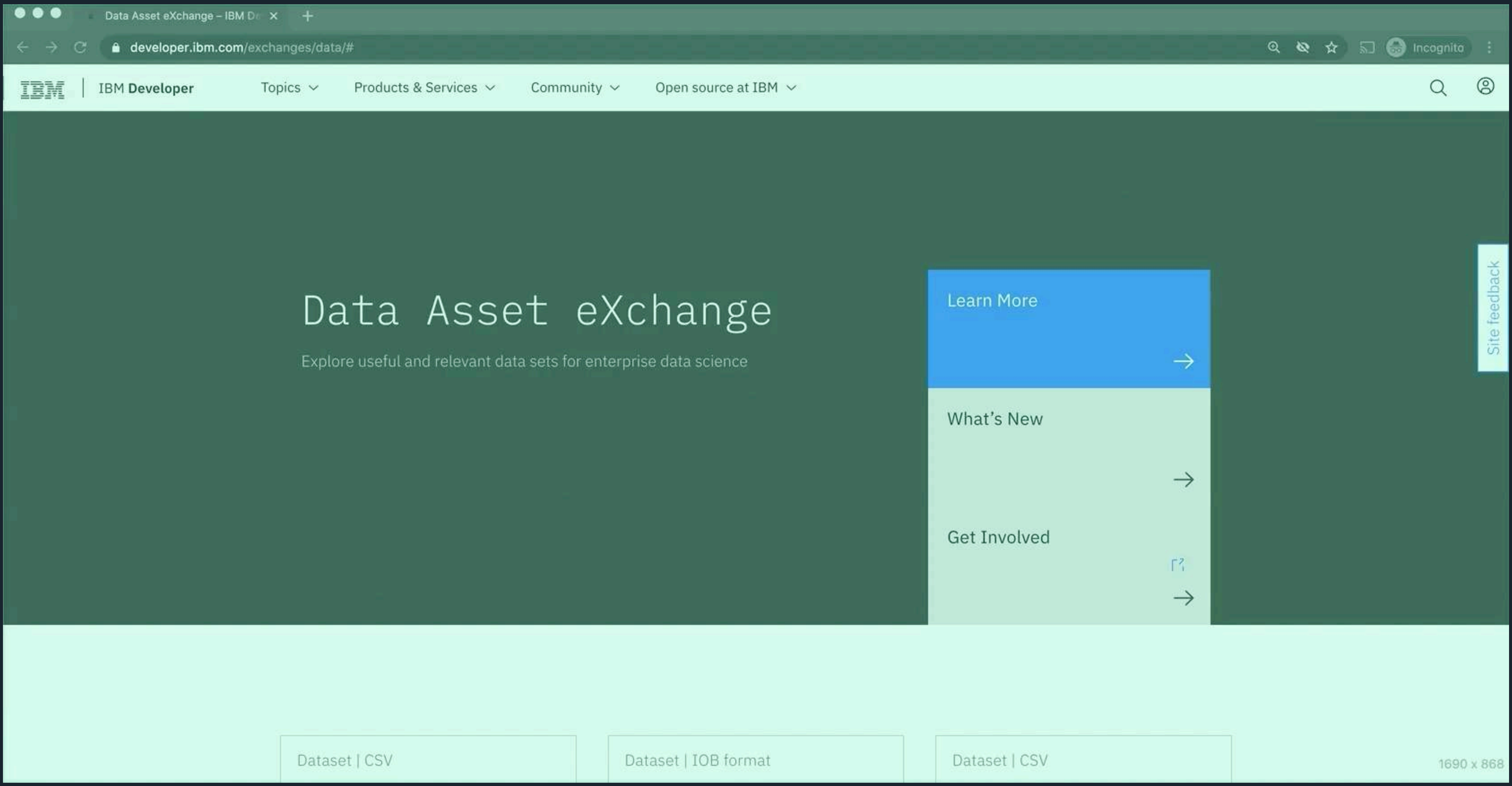
**Website:**
**ibm.biz/data-exchange**



# Data Asset eXchange (DAX)

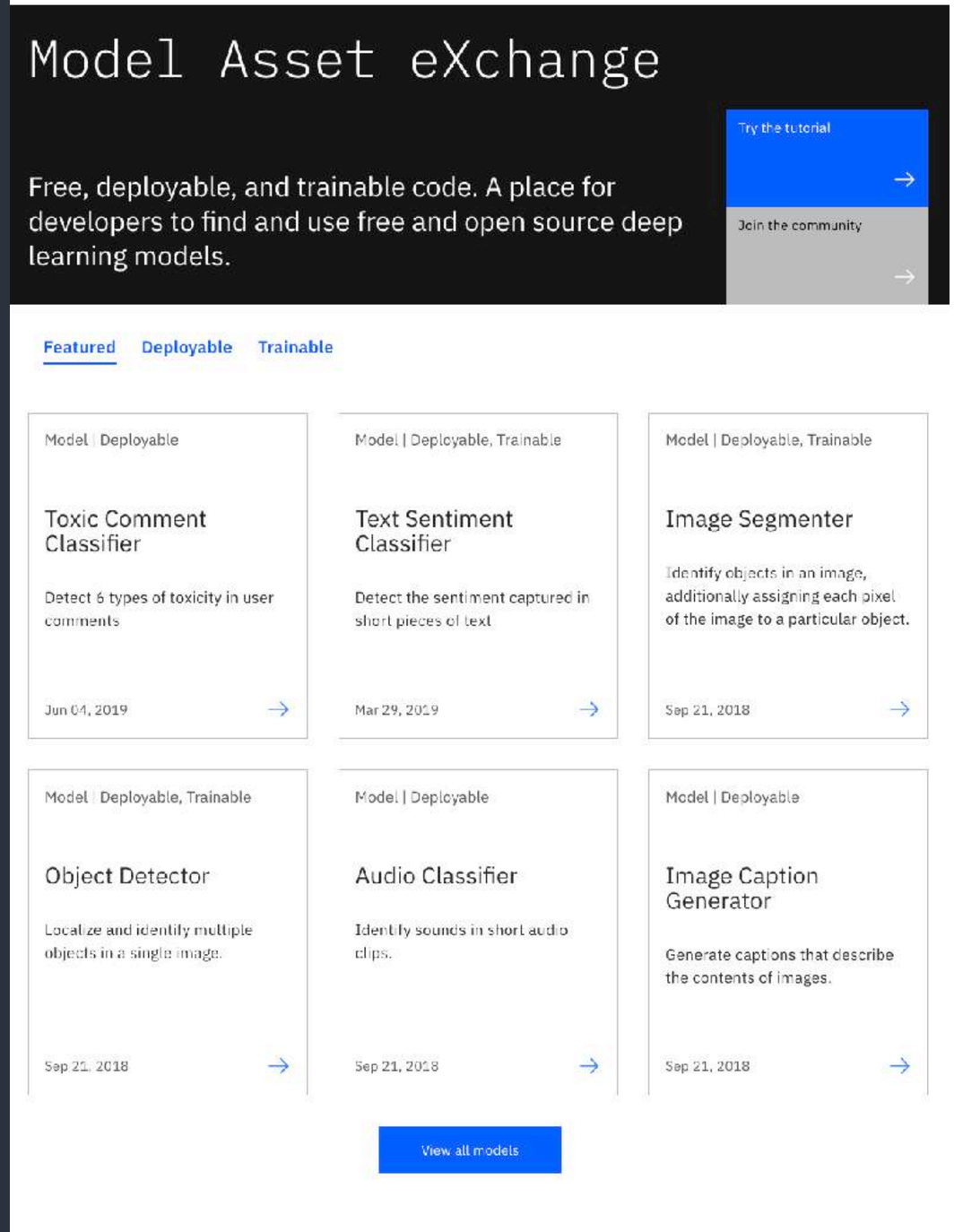
- Curated repository for **open datasets** from IBM Research and third-parties
- Published under data **friendly licenses**
- **Standardized** dataset **formats** and **metadata**
- All datasets include notebooks
  - Data ingesting
  - Data exploration
  - Data analysis

**ibm.biz/data-exchange**


Data Asset eXchange – IBM D
developer.ibm.com/exchanges/data/#
Incognito
IBM Developer
Topics
Products & Services
Community
Open source at IBM
Data Asset eXchange
Explore useful and relevant data sets for enterprise data science
Learn More
What's New
Get Involved
Site feedback
Dataset | CSV
Dataset | IOB format
Dataset | CSV
1690 x 868

# Model Asset eXchange (MAX)

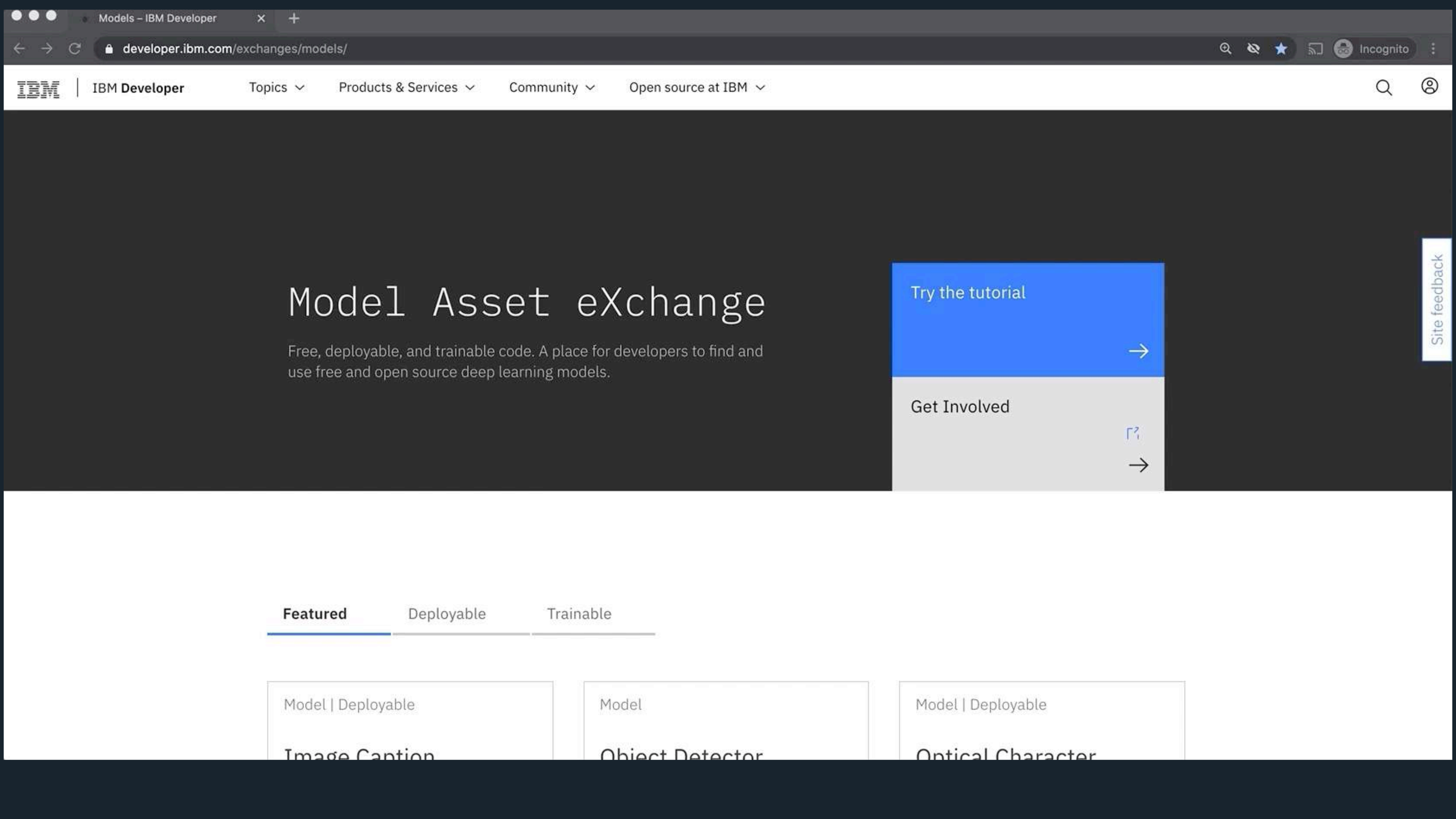
**Website:**
**ibm.biz/model-exchange**

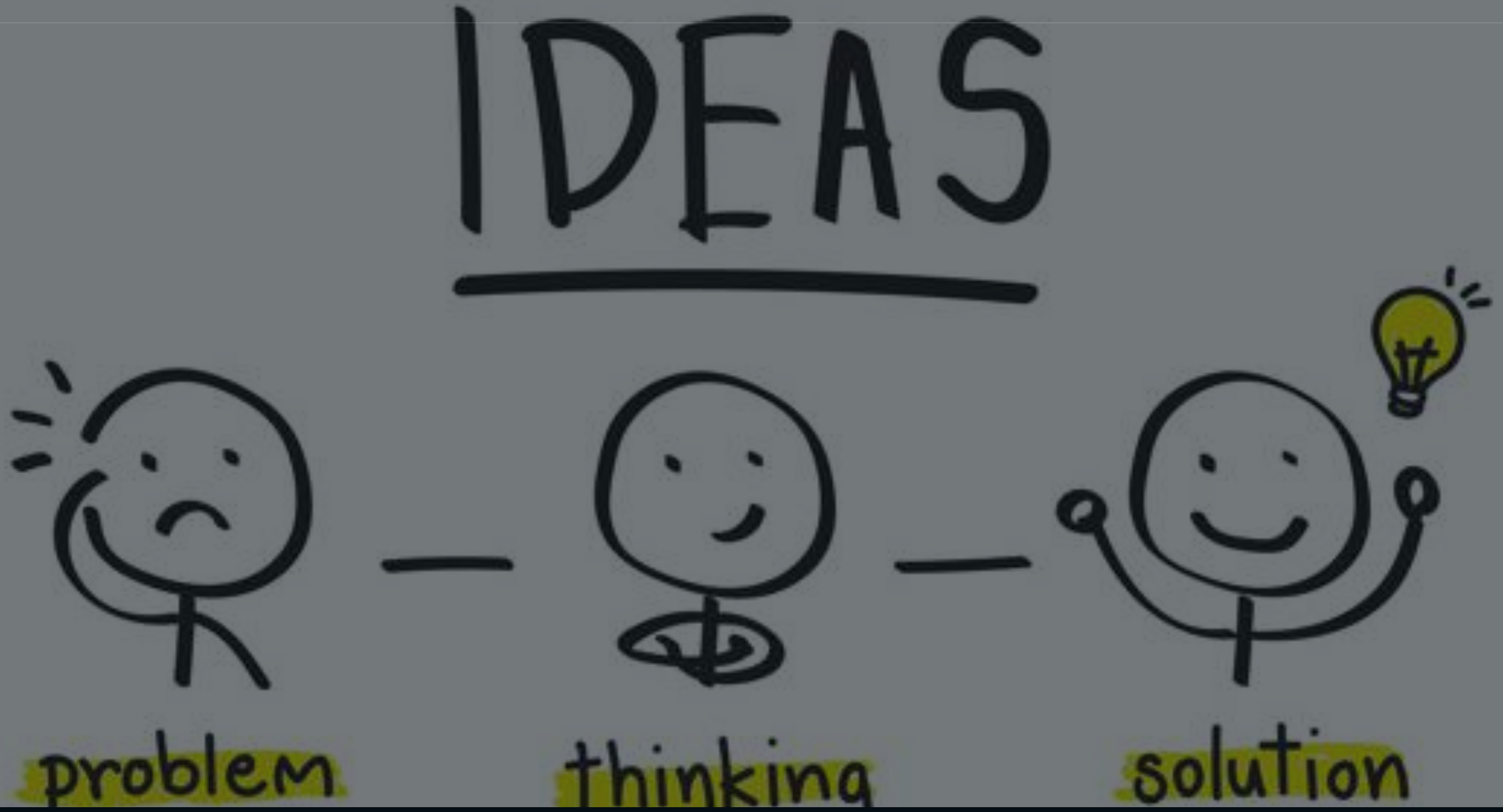


# Model Asset eXchange (MAX)

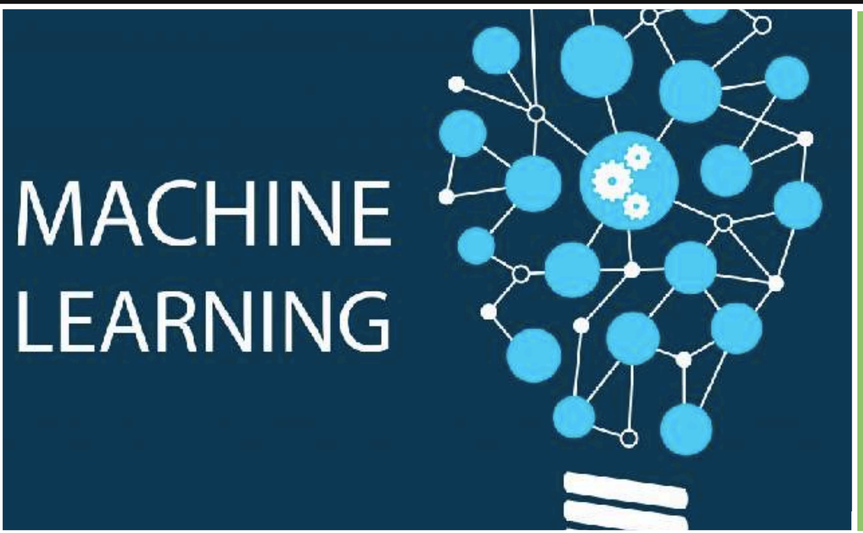
- A place for developers/data scientists to find and use **free** and **open source** deep learning models
- Wide variety of domains  (text, audio, image, etc)
- Multiple deep learning frameworks (TensorFlow, PyTorch, Keras)
- Trainable and Deployable versions

**ibm.biz/model-exchange**


Models – IBM Developer
developer.ibm.com/exchanges/models/
Incognito
IBM Developer
Topics
Products & Services
Community
Open source at IBM
Model Asset eXchange
Free, deployable, and trainable code. A place for developers to find and use free and open source deep learning models.
Try the tutorial
Get Involved
Site feedback
Featured
Deployable
Trainable
Model | Deployable
Image Caption
Model
Object Detector
Model | Deployable
Optical Character

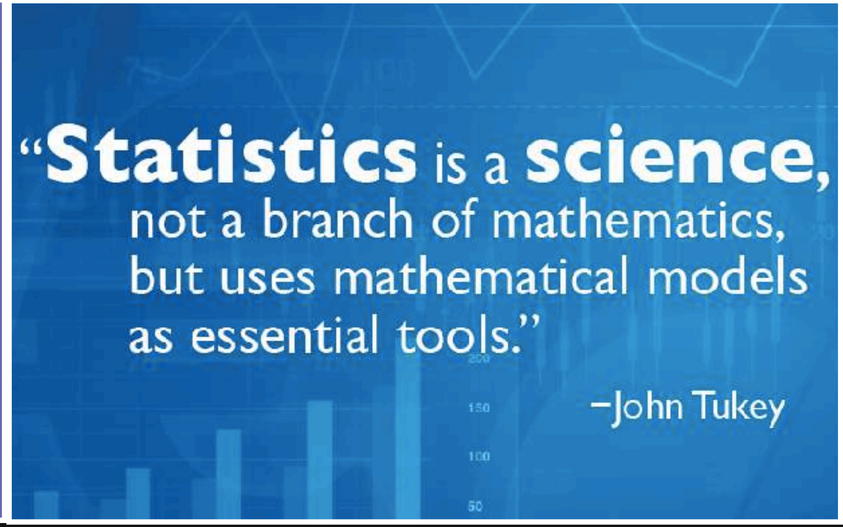



# IMPORTANT SKILLS FOR A DATA SCIENTIST



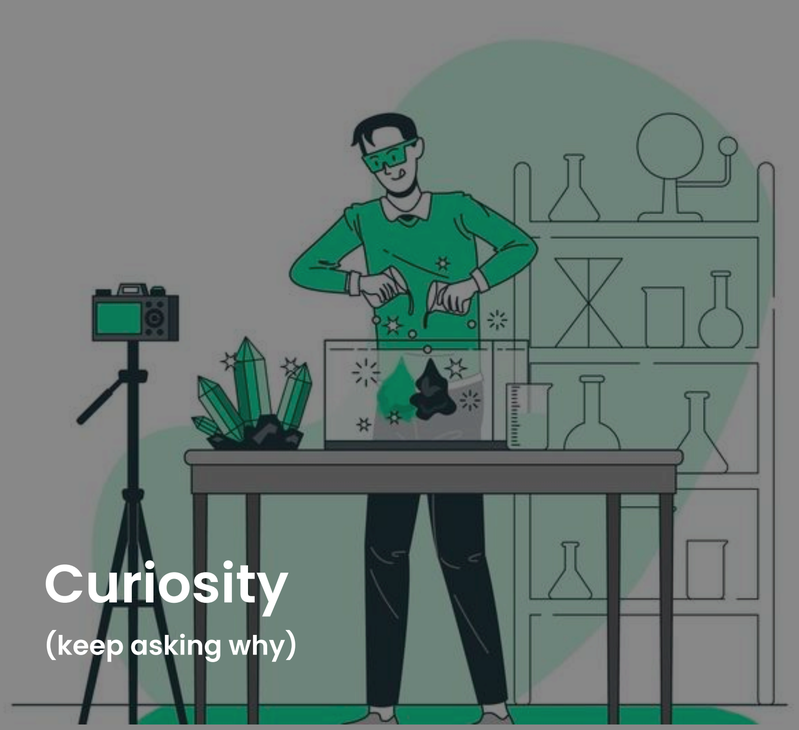

Machine Learning

Statistics




Programming


Communication


Curiosity
(keep asking why)


A...Z
Flexibility


Critical Thinking


Ethics


BE
YOURSELF
Be yourself

# Thank you!

slides: **bit.ly/eusr20**

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Resources on AI, DS, ML
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