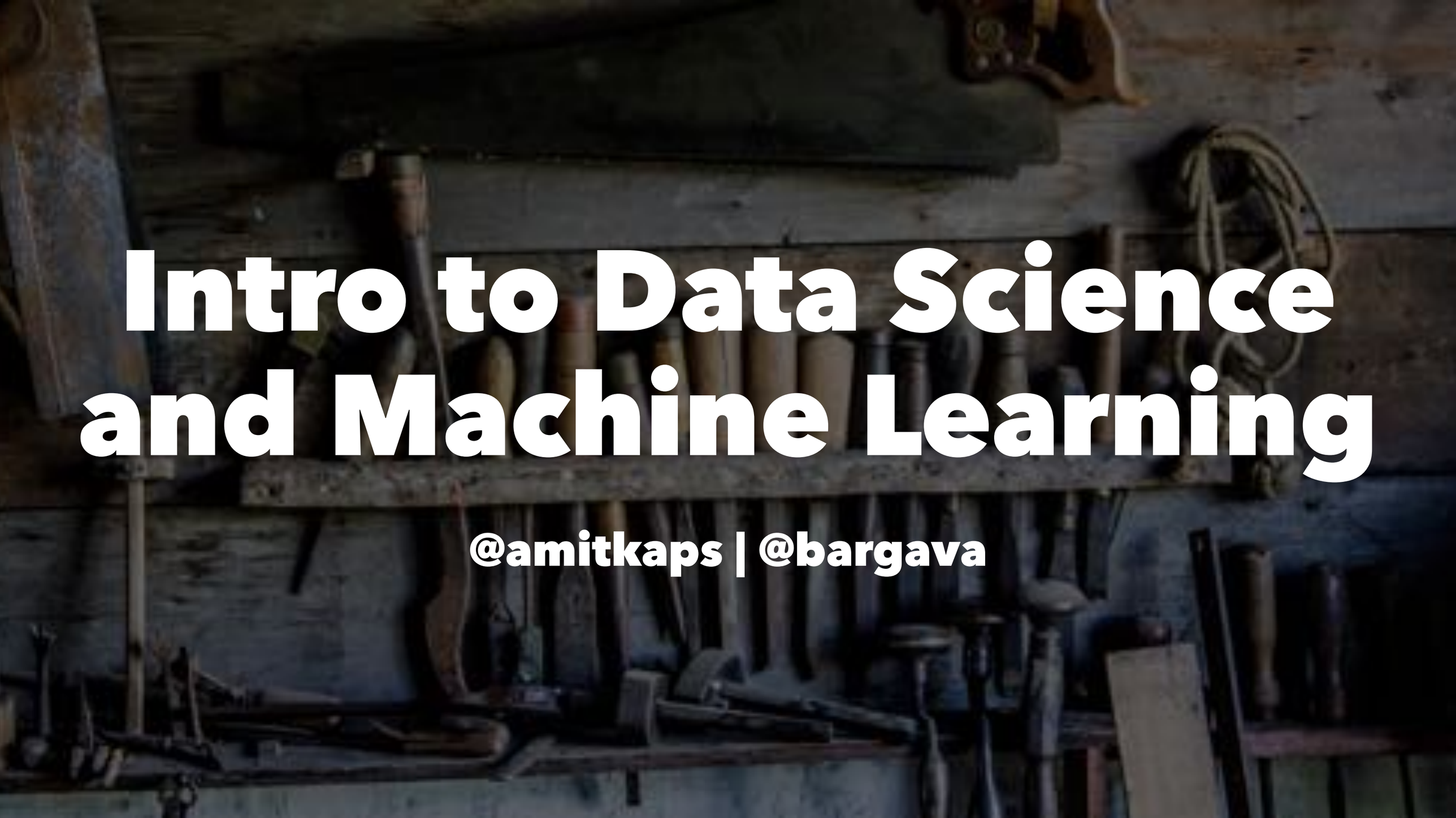
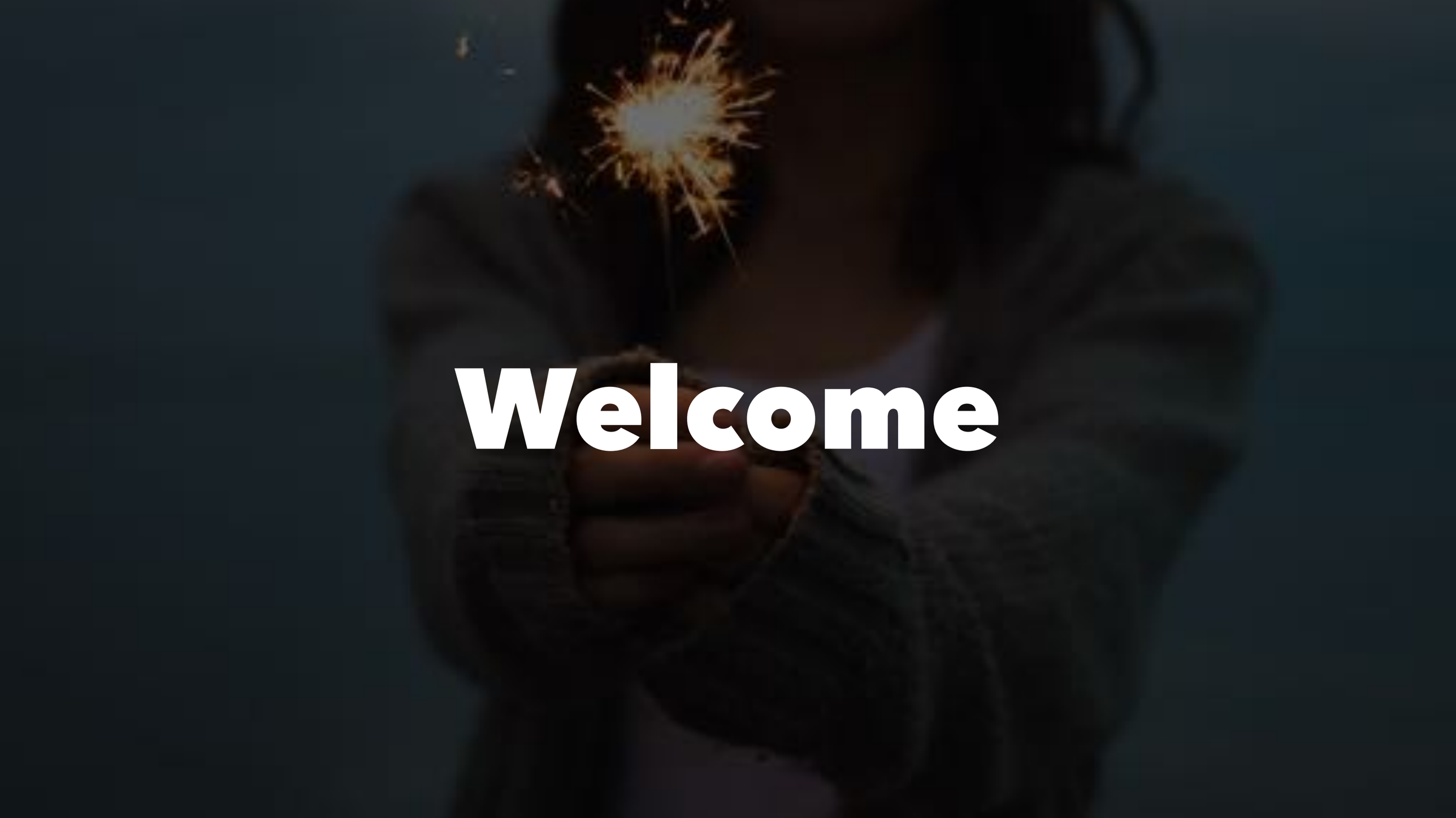


# Intro to Data Science and Machine Learning

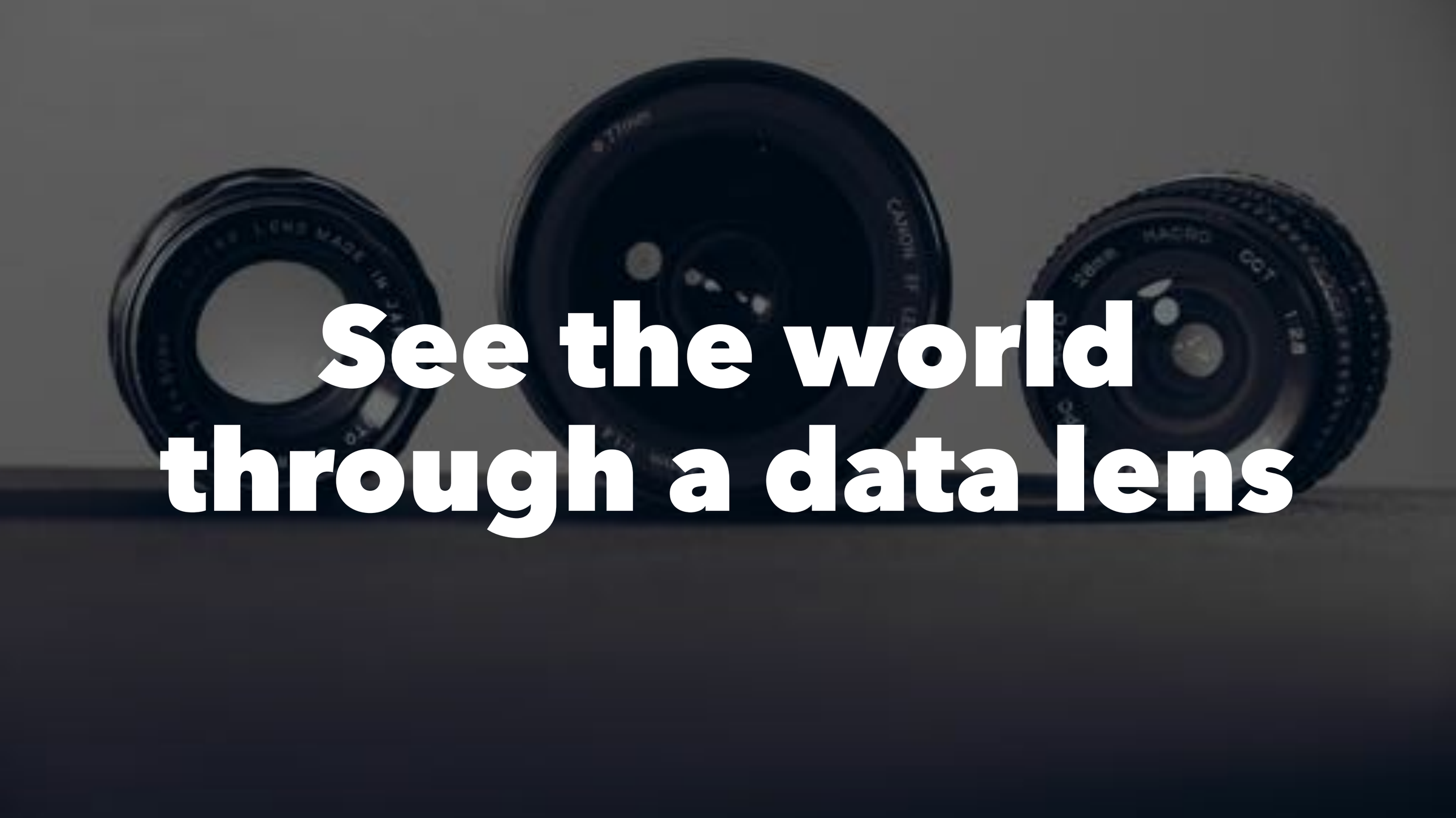
@amitkaps | @bargava


Welcome

# Facilitators

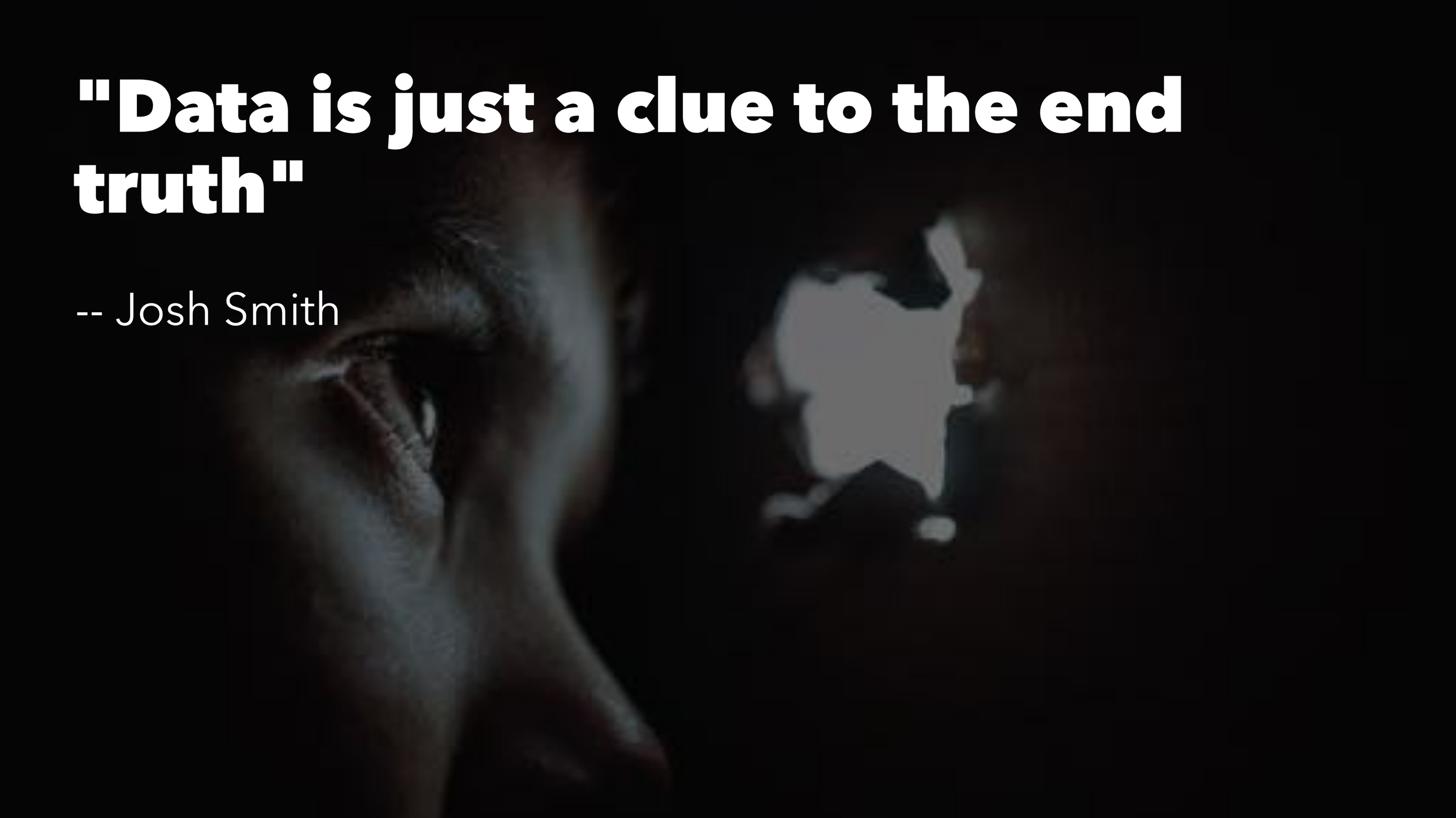

Amit
@amitkaps


Bargava
@bargava

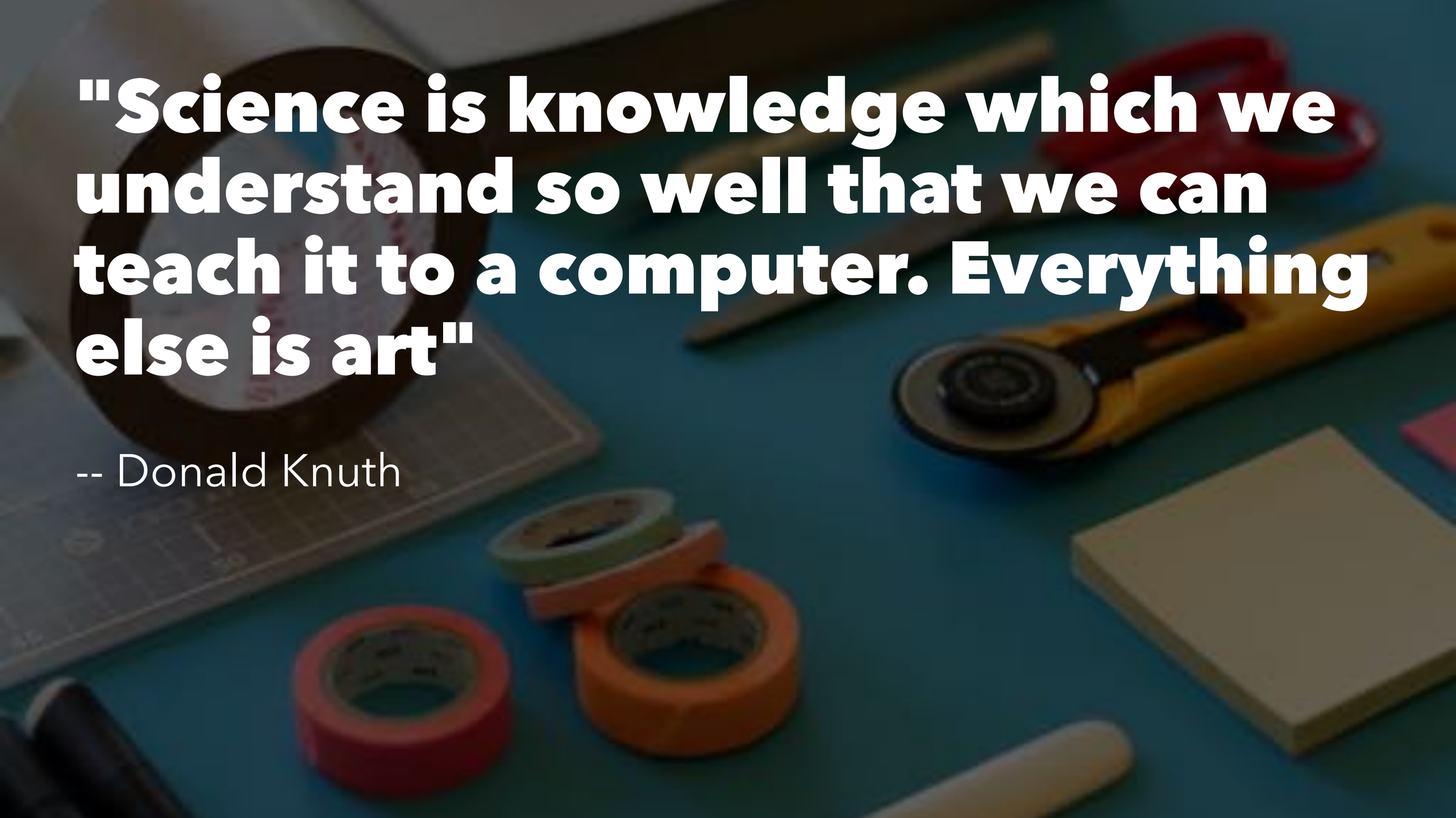

See the world
through a data lens

# "Data is just a clue to the end truth"

-- Josh Smith




Data Driven Decisions


"Science is knowledge which we understand so well that we can teach it to a computer. Everything else is art"
-- Donald Knuth


Data Science is an Art

# Hypothesis Driven Approach

# Frame

"An approximate answer to the right problem is worth a good deal"

# Acquire

"80% perspiration, 10% great idea, 10% great output"


Refine
"All data is messy."

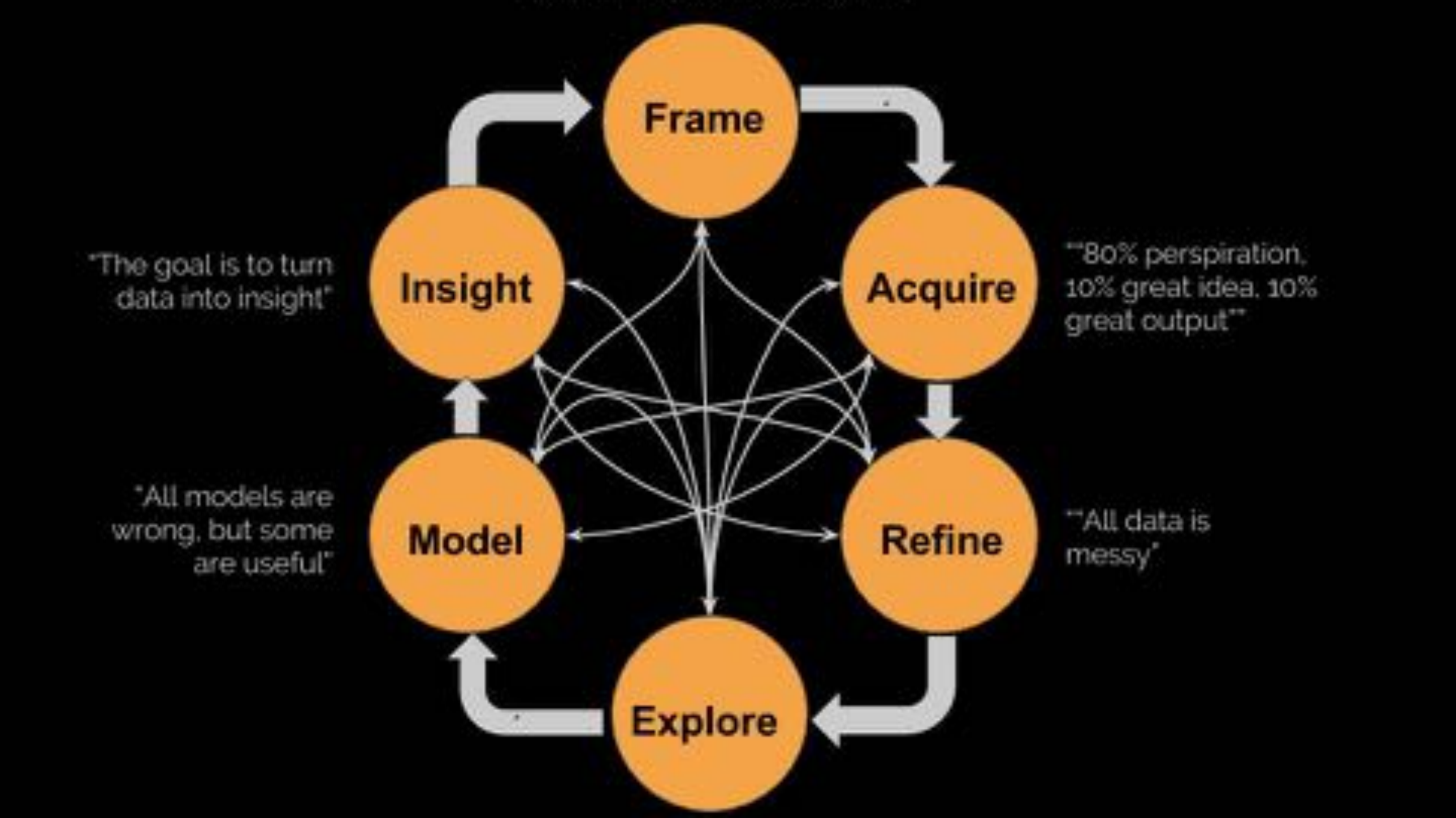
# Explore

"I don't know, what I don't know."

# Model

"All models are wrong, but some are useful"


Insight
"The goal is to turn data into insight"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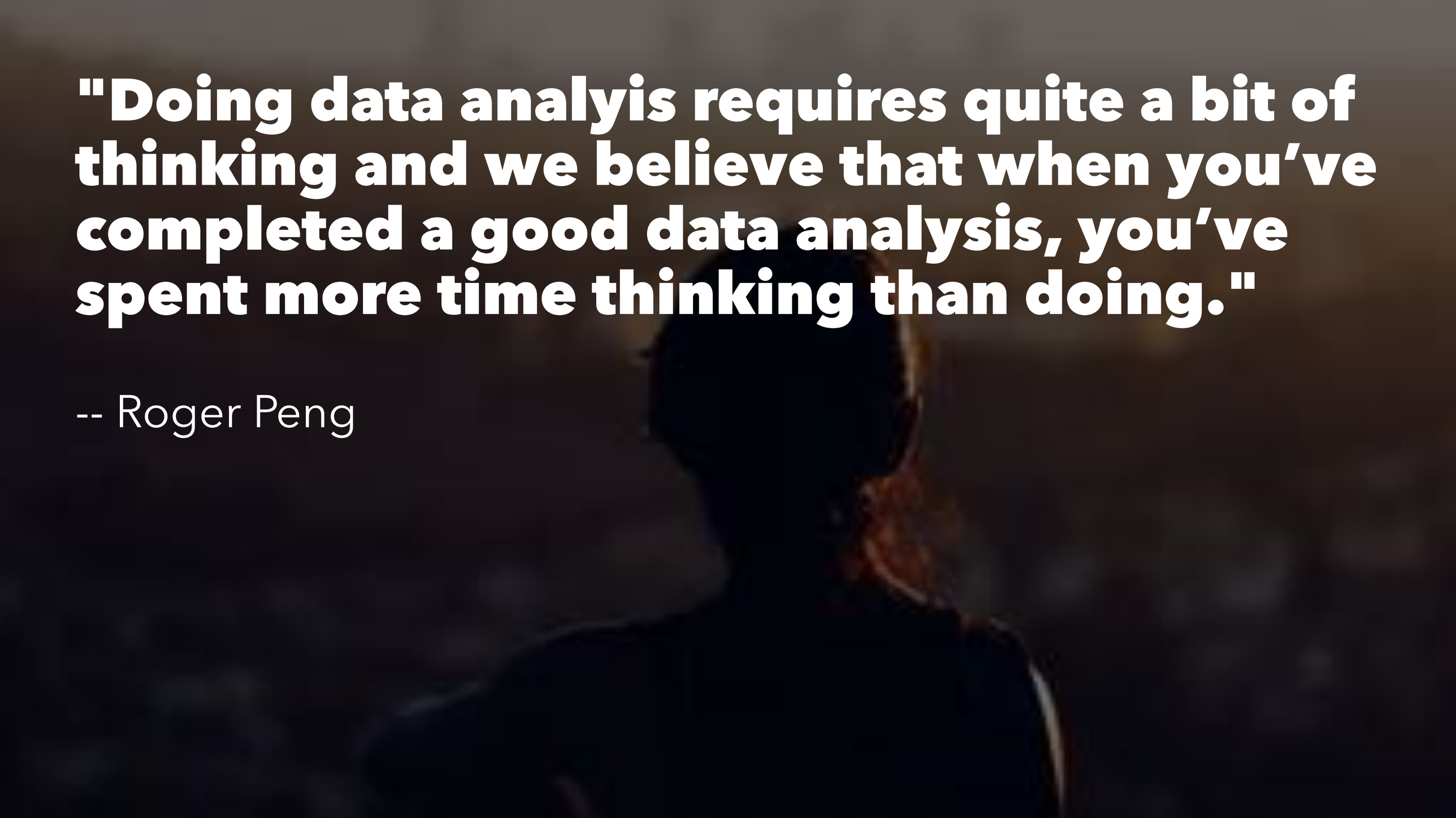
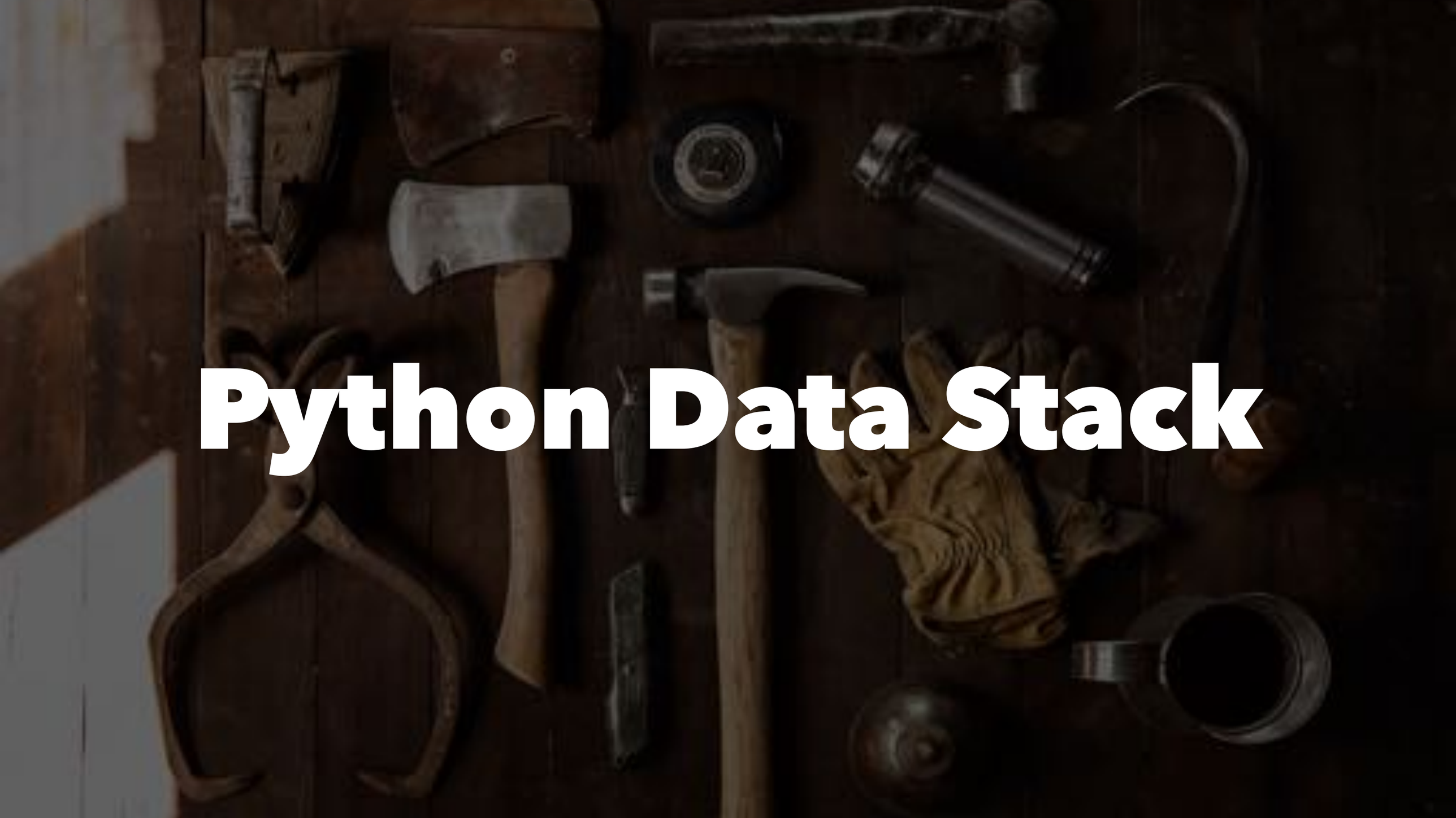
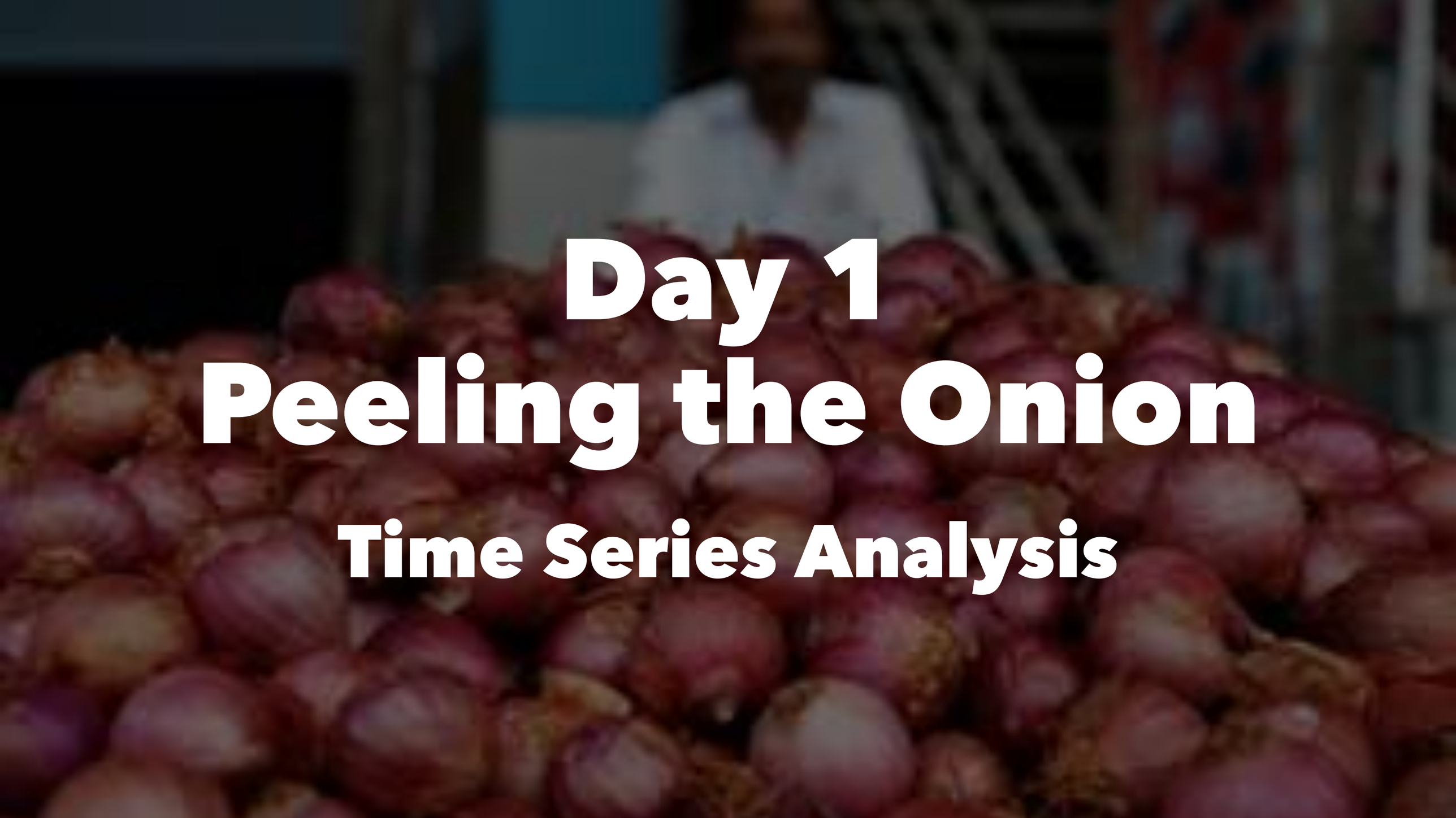

"Doing data analyis requires quite a bit of thinking and we believe that when you've completed a good data analysis, you've spent more time thinking than doing."
-- Roger Peng


Python Data Stack


Case Studies



# Day 1
# Peeling the Onion
## Time Series Analysis

# Day 2
# Grocery

## Market Basket Analysis / Collaborative Filter

# Day 2
# BanK Marketing

## Random Forest and Gradient Boosting

# Day 3
# DataTau

## Text Analytics

# Learning Approach


Do the Exercises


Pair up & Learn


Call for Help


Enjoy the workshop

# Workshop Material is available at the Github Repo

https://github.com/amitkaps/machine-learning

# Exercise

# 1. Time Series Exercise

**"Predict the number of tickets that will be raised in the next week"**

- **Frame**: What to forecast? At what horizon? At what level?
- **Acquire, Refine, Explore**: Do EDA to understand the trend and pattern within the data
- **Models**: Mean Model, Linear Trend, Random Walk, Simple Moving Average, Exp Smoothing, Decomposition, ARIMA
- **Insight**: Share the insight through a datavis of the models

# 2. Text Analytics Exercise

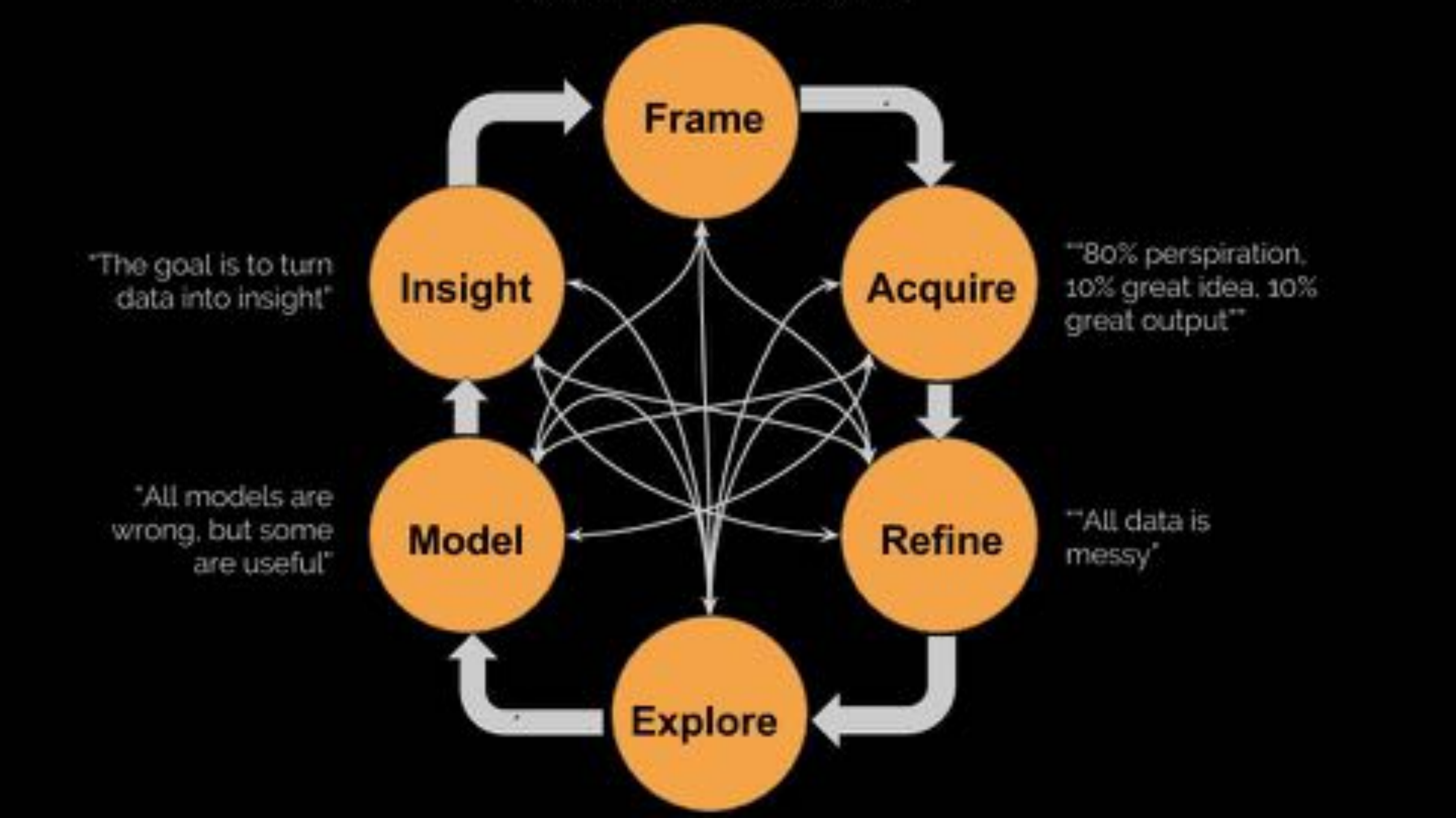
**"Identify the entity, features & topics in the 'Comments' data or 'Twitter #machine learning' data"**

- **Frame**: What are the comments you are trying to understand?
- **Acquire, Refine, Explore**: Do Wordcloud, Lemmatization, Part of Speech Analysis, and Entity Chunking
- **Models**: TF-IDF, Topic Modelling, Sentiment Analysis
- **Insight**: Share the insight through word cloud and topic

# Feedback

https://amitkaps.typeform.com/to/i6wl2E

# Recap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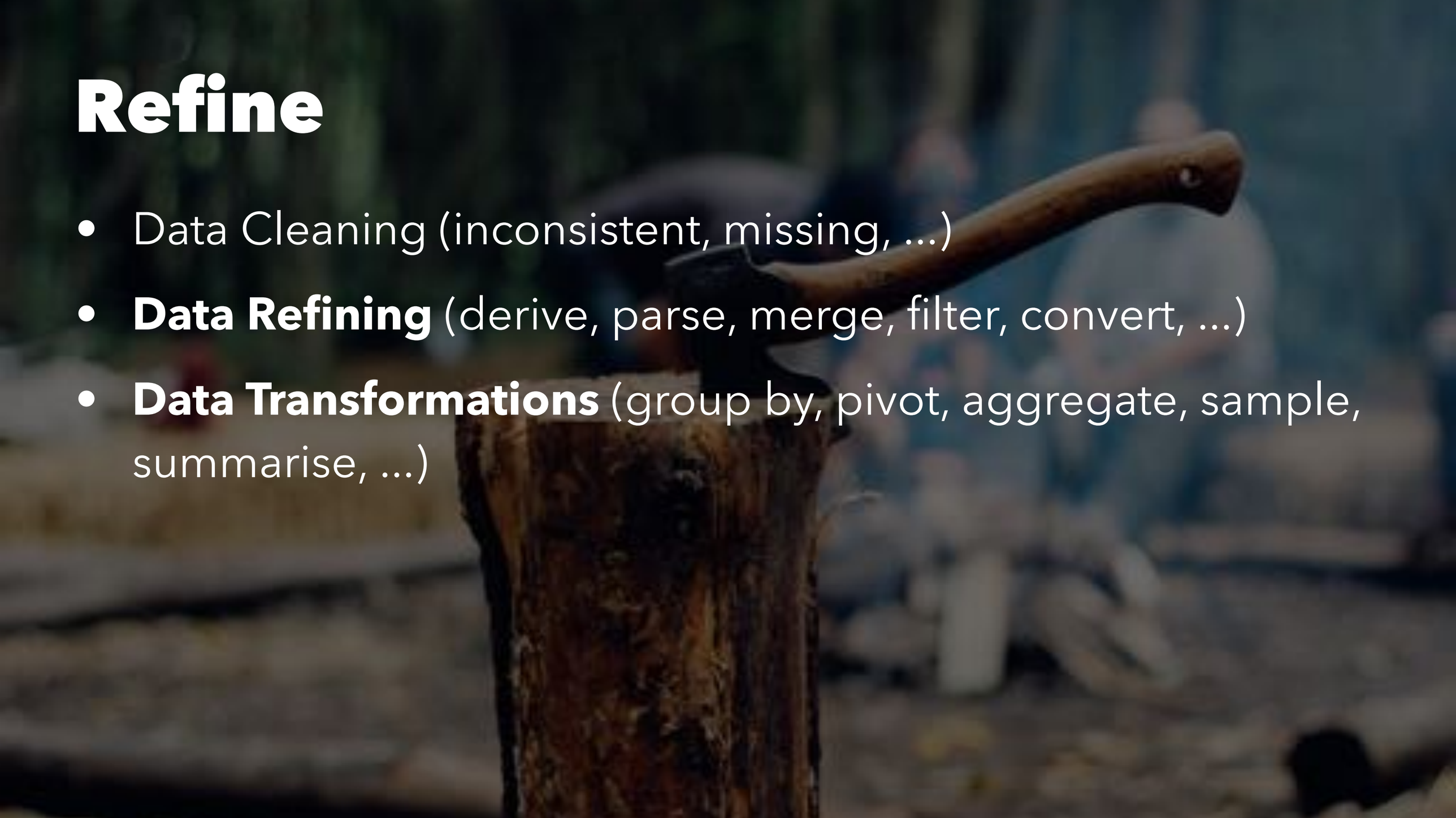
"All data is messy"

# Frame

- **Toy Problems**
- **Simple Problems**
- Complex Problems
- Business Problems
- Research Problems

# Acquire

- **Scraping** (structured, unstructured)
- **Files** (csv, xls, json, xml, pdf, ...)
- Database (sqlite, ...)
- APIs
- Streaming



# Refine

- Data Cleaning (inconsistent, missing, ...)
- **Data Refining** (derive, parse, merge, filter, convert, ...)
- **Data Transformations** (group by, pivot, aggregate, sample, summarise, ...)

# Explore

- **Simple Vis**
- Multi Dimensional Vis
- Geographic Vis
- Large Data Vis (Bin - Summarise - Smooth)
- Interactive Vis

# Model - Supervised Learning

- *Continuous*: Regression - **Linear**, Polynomial, Tree Based Methods - CART, **Random Forest**, Gradient Boosting Machines
- *Classification* - **Logistics Regression**, Tree, KNN, SVM, Naive-Bayes, Bayesian Network

# Model - UnSupervised Learning

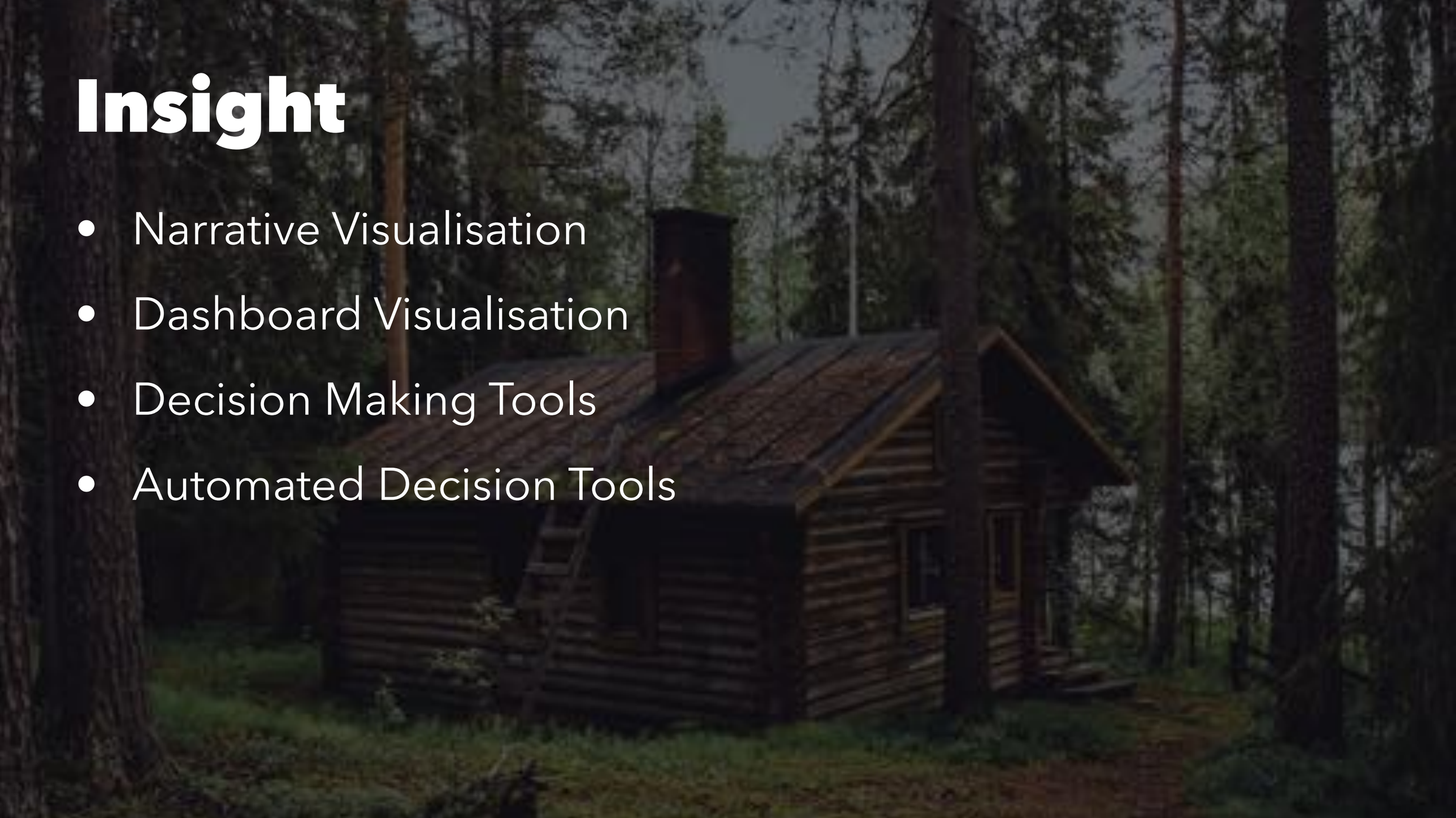
- *Continuous*: Clustering & Dimensionality Reduction like PCA, SVD, MDS, K-means
- *Categorical*: Association Analysis

# Model - Advanced /

- **Time Series**
- **Text Analytics**
- Network / Graph Analytics
- Optimization

# Model - Specialized

- Reinforcement Learning
- Online Learning
- Deep Learning
- Other Applications: Image, Speech



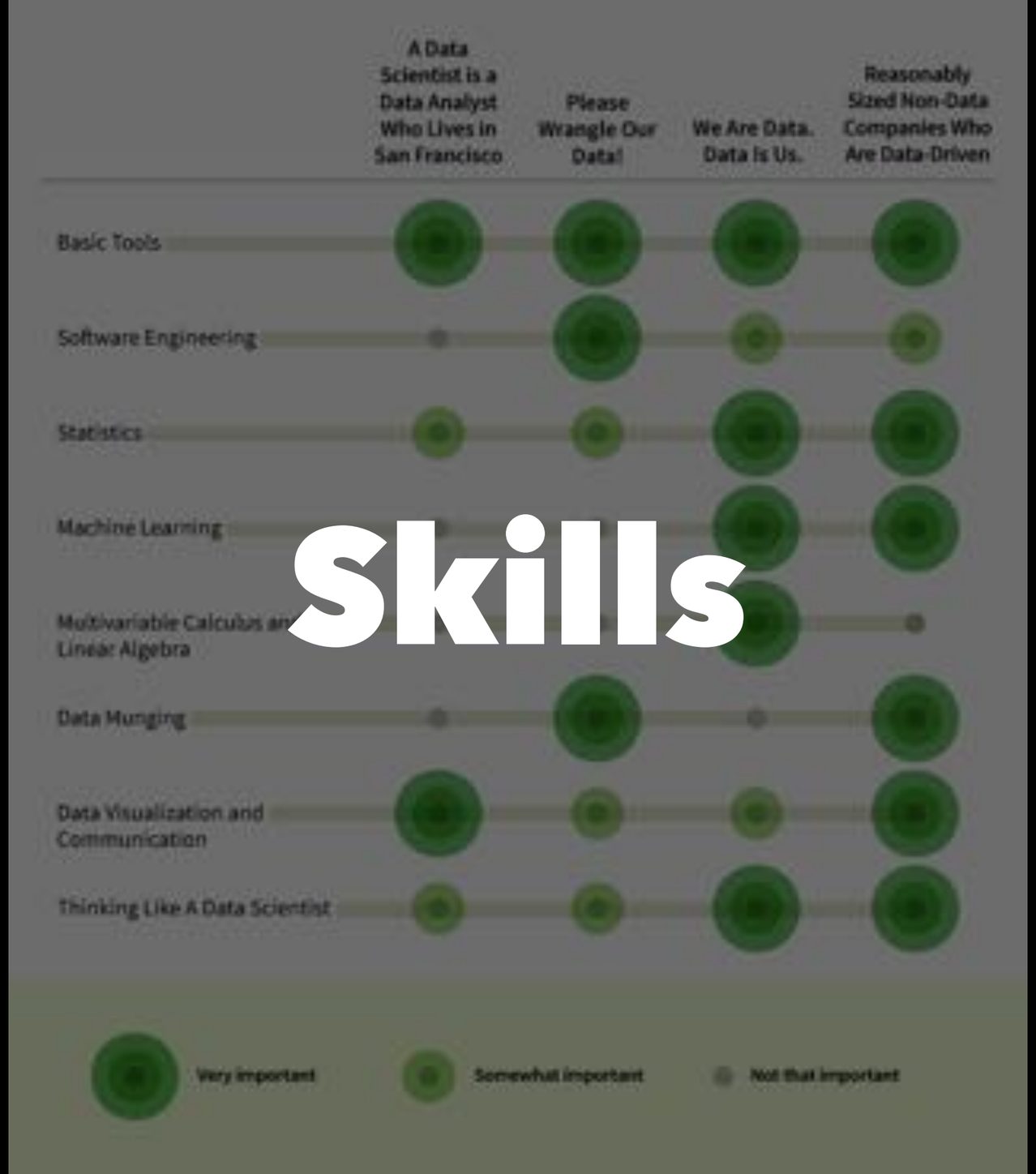
# Insight

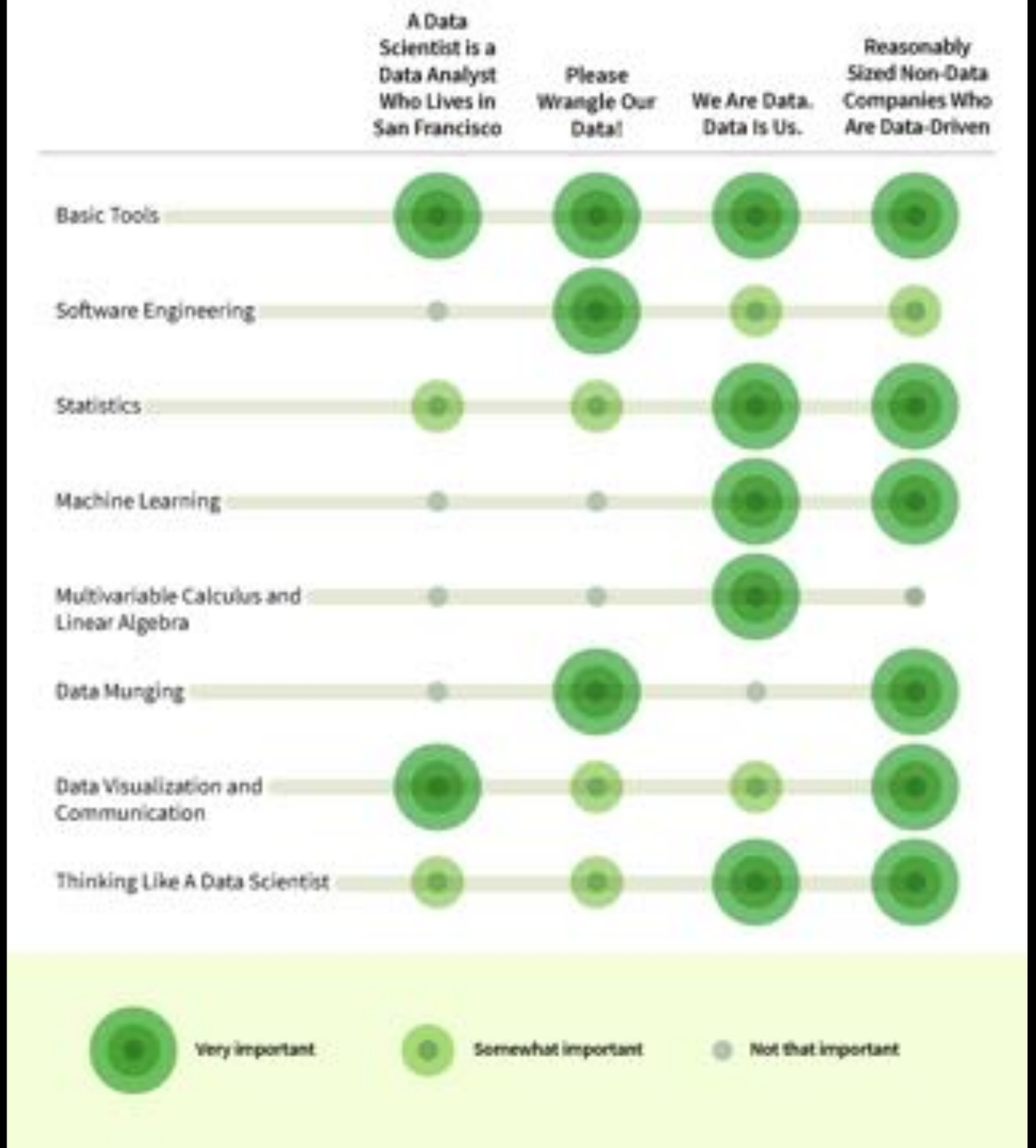
- Narrative Visualisation
- Dashboard Visualisation
- Decision Making Tools
- Automated Decision Tools

# PyData Stack

- **Acquire / Refine**: Pandas, Beautiful Soup, Selenium, Requests, SQL Alchemy, Numpy, Blaze
- **Explore**: MatPlotLib, Seaborn, Bokeh, Plotly, Vega, Folium
- **Model**: Scikit-Learn, StatsModels, SciPy, Gensim, Keras, Tensor Flow, PySpark
- **Insight**: Django, Flask

# Skills


A Data Scientist is a Data Analyst Who Lives in San Francisco
Please Wrangle Our Data!
We Are Data. Data Is Us.
Reasonably Sized Non-Data Companies Who Are Data-Driven
Basic Tools
Software Engineering
Statistics
Machine Learning
Multivariable Calculus and Linear Algebra
Data Munging
Data Visualization and Communication
Thinking Like A Data Scientist
Very important
Somewhat important
Not that important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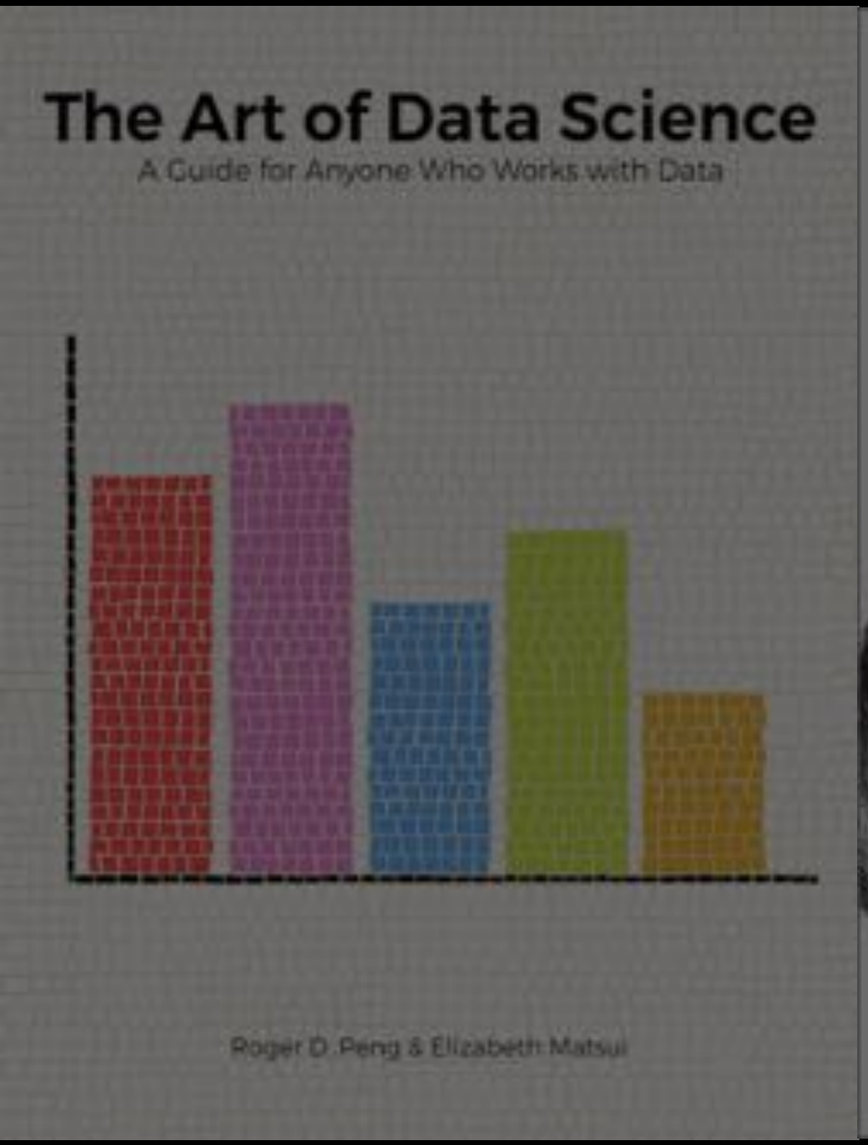
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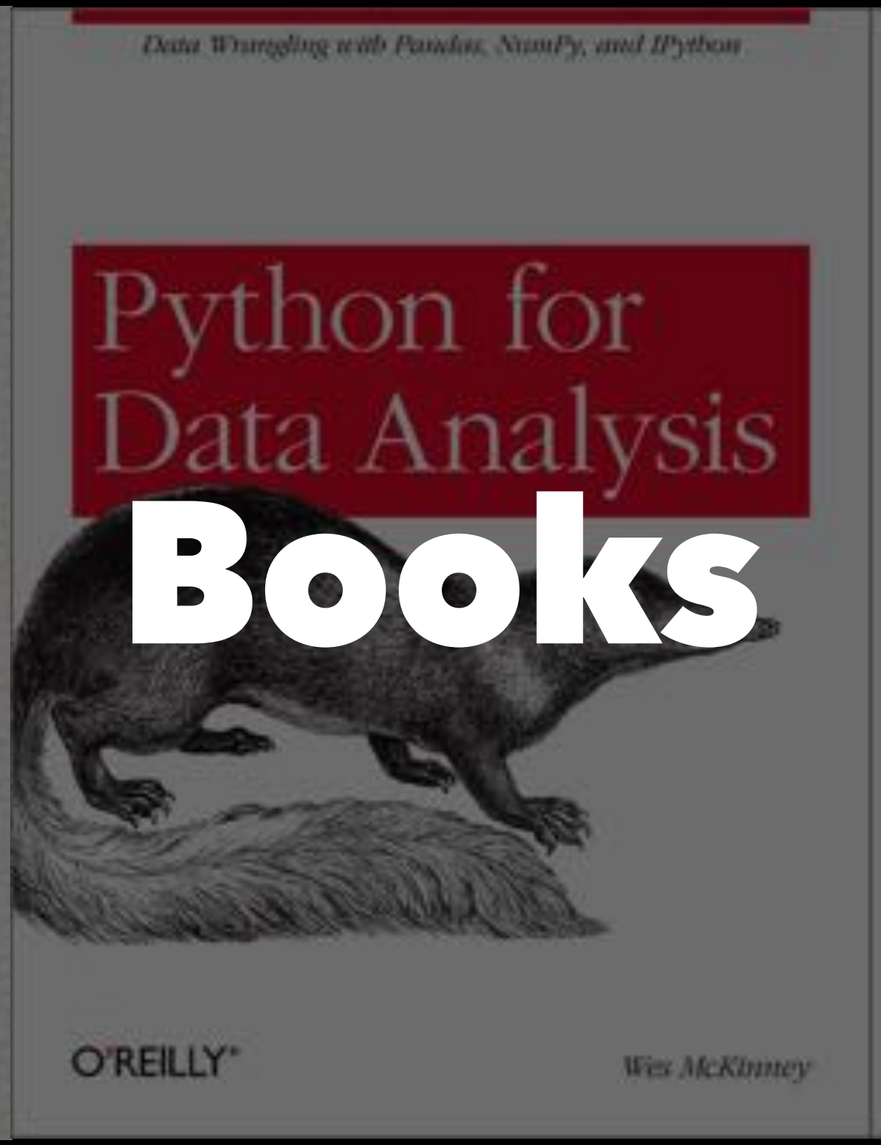
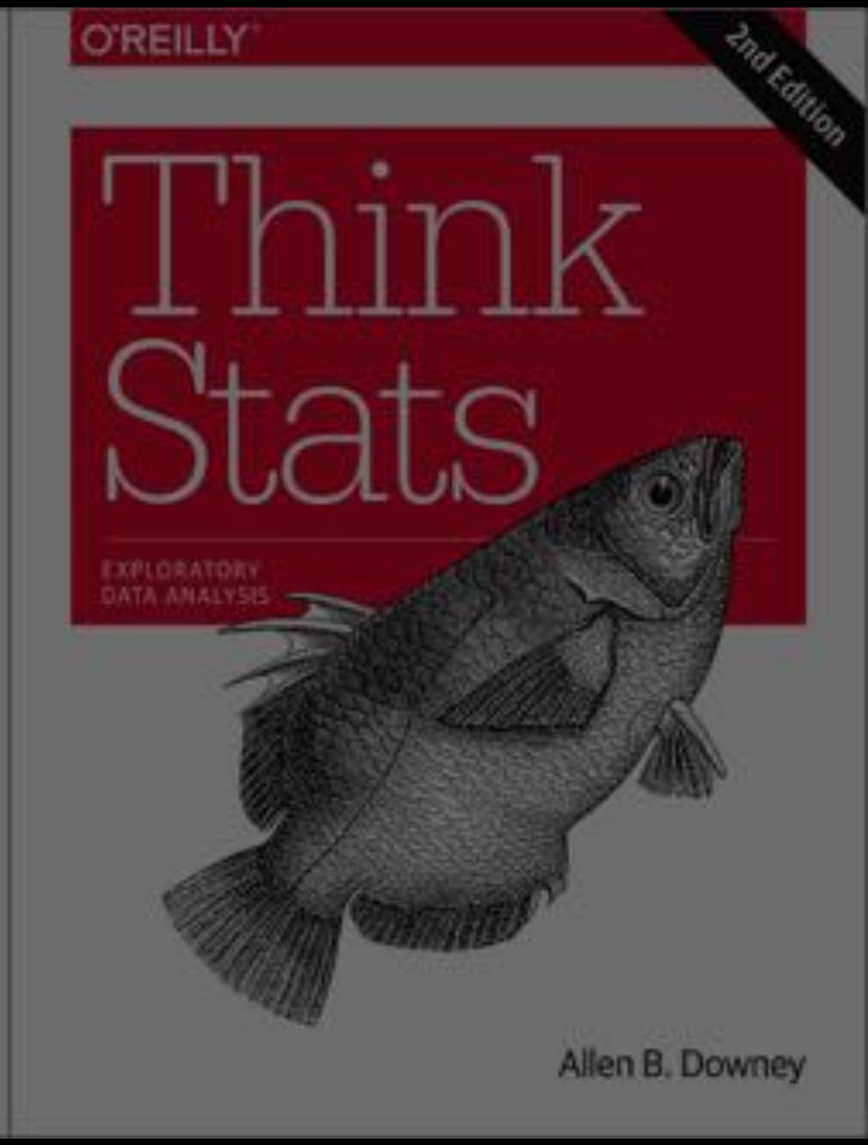
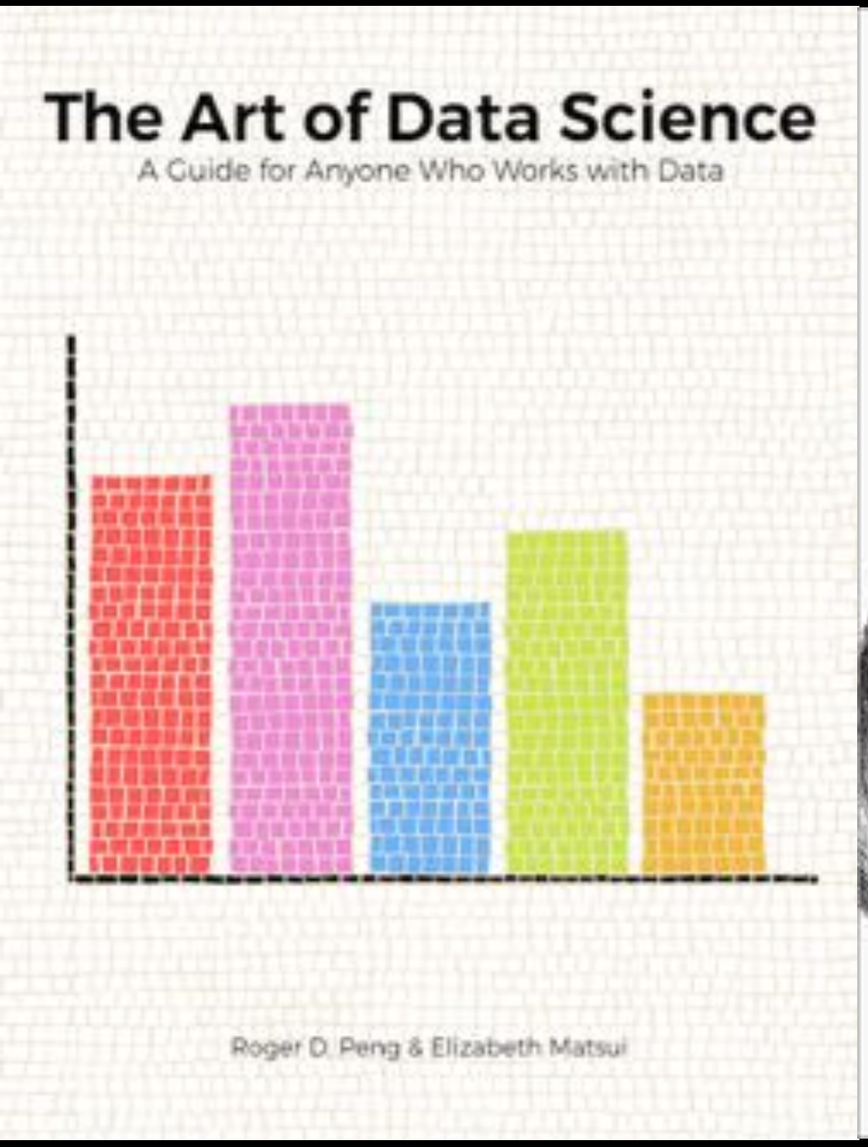

Data Wrangling with Pandas, NumPy, and IPython
Python for Data Analysis
O'REILLY
Wes McKinney

# Books


O'REILLY
2nd Edition
Think Stats
EXPLORATORY DATA ANALYSIS
Allen B. Downey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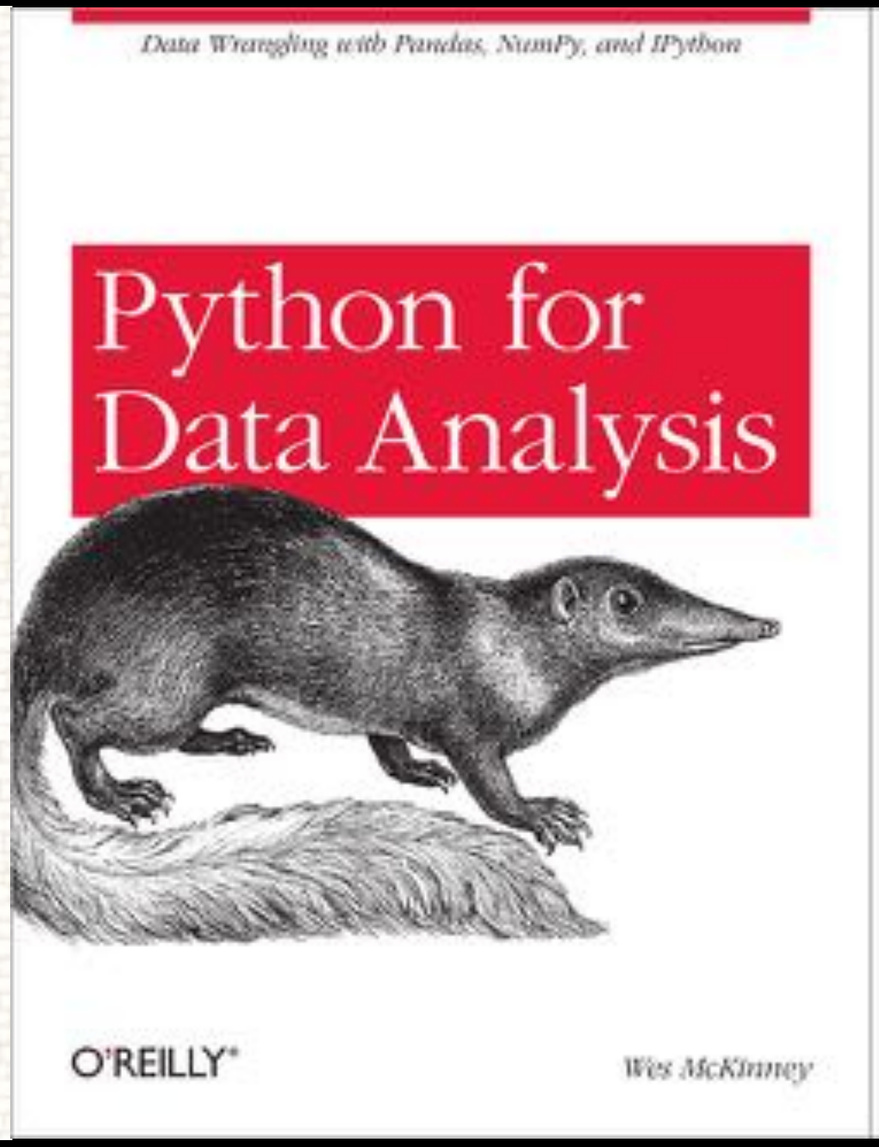
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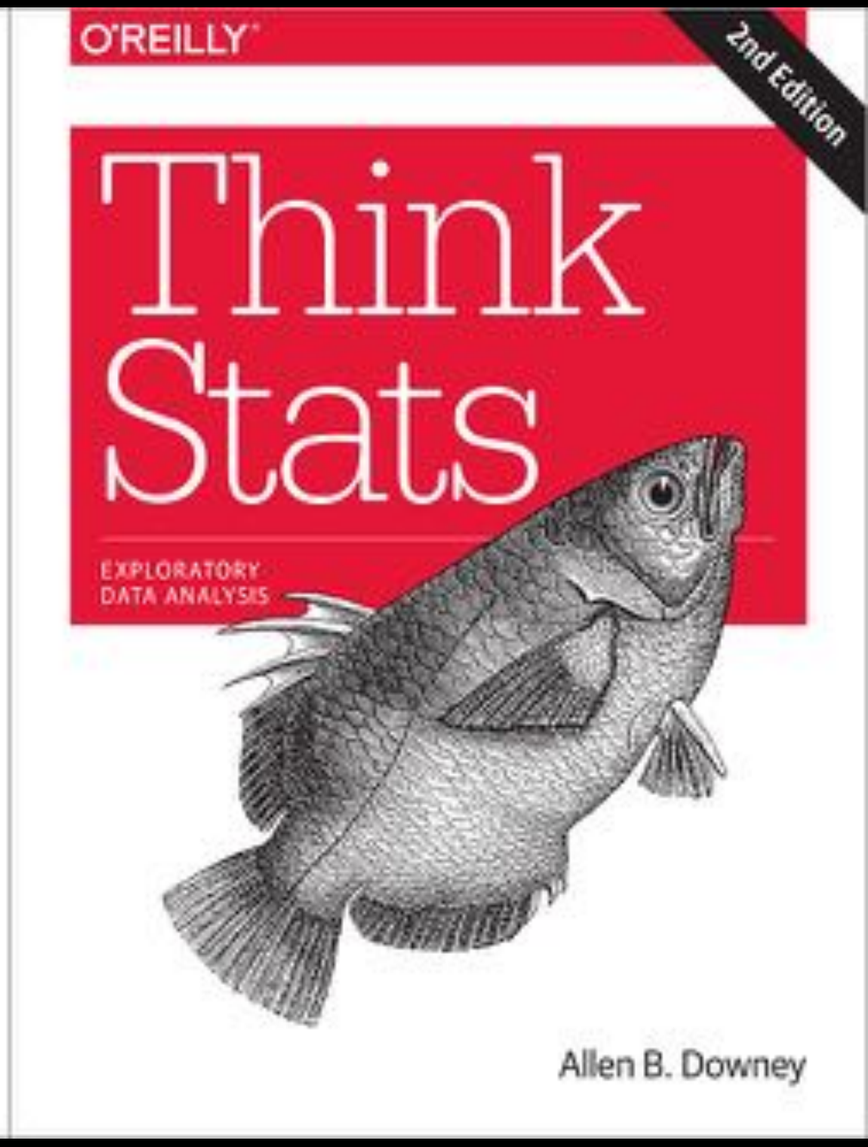
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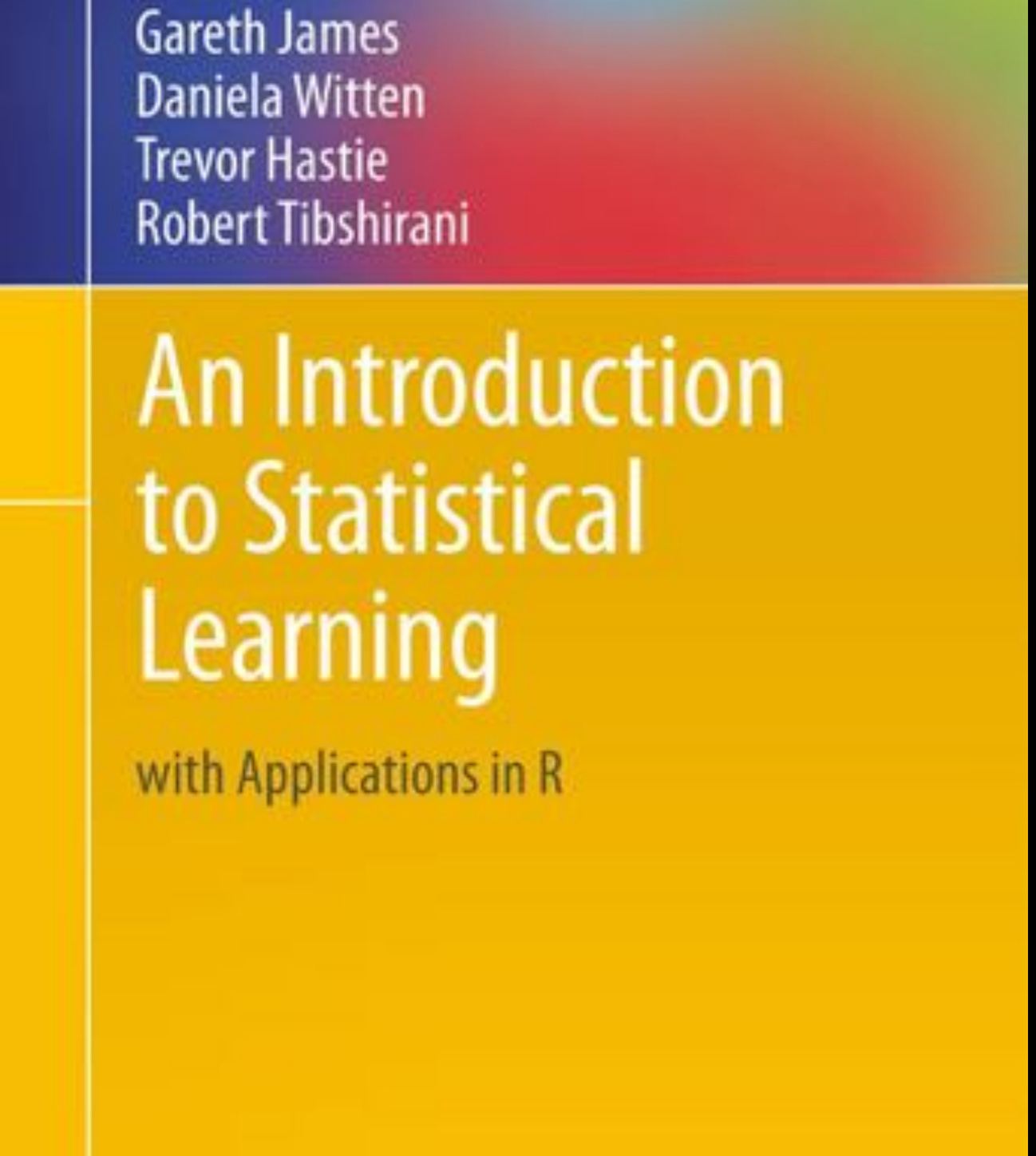


# Resources - Statistical Learning

- One of the good books on statistical learning is ISLR -> An Introduction to Statistical Learning with Application in R
- You can find all the ISLR code in python at this github repo - https://github.com/JWarmenhoven/ISLR-python

# Resources - Time Series

- Forecasting: Principle and Text
- Statistical forecasting: Notes on regression and time series analysis Case

# Resources - Text Analytics

- Natural Language Processing with Python

# Online Course

- Harvard Data Science Course - CS 109 Course (It is structured in similar way to the approach we shared)
- Data Science Specialisation - JHU Data Science (It is a good course, though the material is coded in R)
- Many more on Coursera & Udacity...


We enjoyed the workshop!


Speak to Us!


Thank you
@amitkaps | @bargava