Structure & optimal flow

COURSE CREATION AT DATACAMP

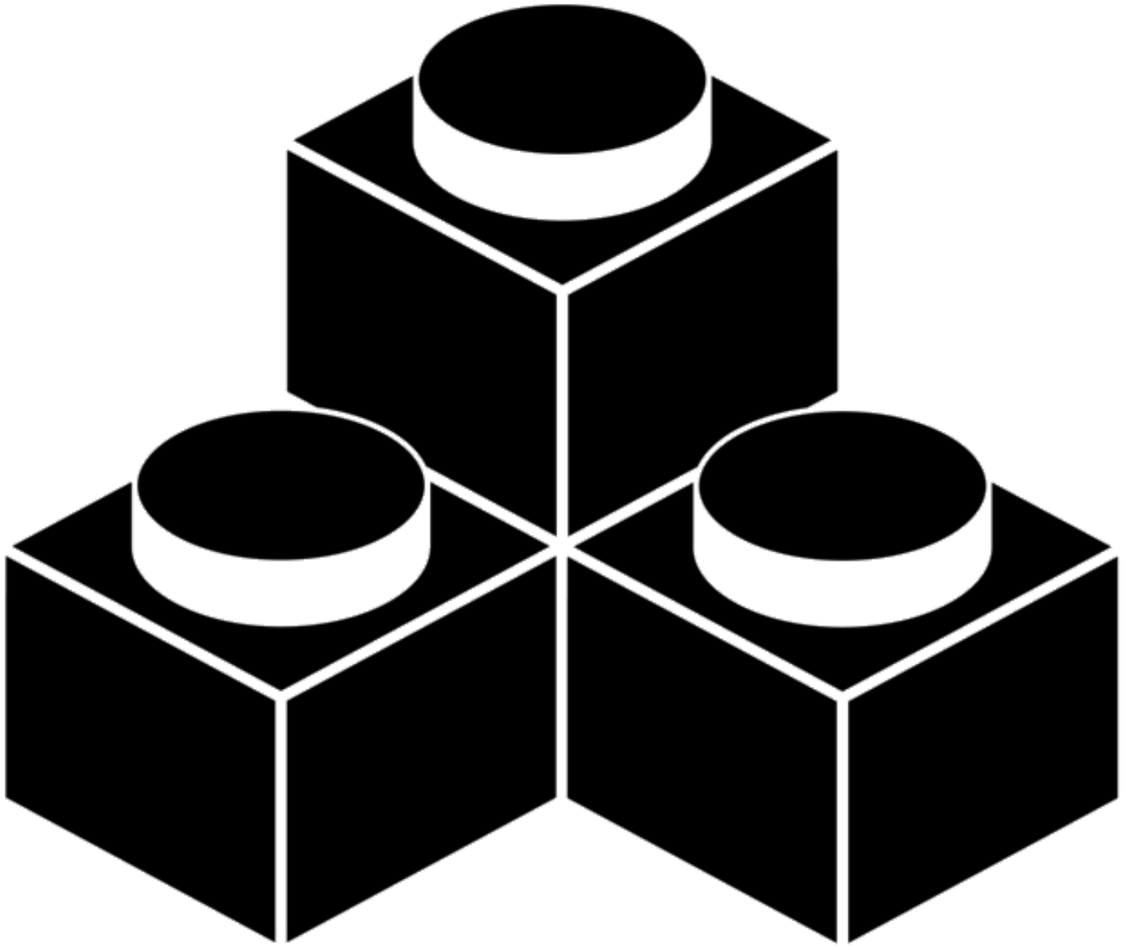


David Campos
Content Developer

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Contents

- Structure and flow of:
  - Course
  - Chapters
  - Lessons
- Development flow



Structure & flow of courses

- A series of lessons that teach a distinct subject
  - e.g. *Introduction to the Tidyverse*
  - e.g. *Machine Learning for Finance in Python*
- **Courses** are broken into **chapters**

Structure & flow of courses

- **Chapter 1**
  - Motivation
  - Transition into core topics
  - Cliff hanger
- **Chapter 2 and 3**
  - Core topics
- **Chapter 4**
  - Bringing it all together
  - Congratulations, summarize, conclude

Structure & flow of chapters

- A series of lessons
  - Related topics
- **Chapters** are composed by **lessons**

Structure & flow of lessons

DataCamp lessons

- **Video Exercise**
  - subtopics: A, B, C
- Interactive Exercise (Coding, Multiple Choice, etc)
  - subtopic: A
- Interactive Exercise (Coding, Multiple Choice, etc)
  - subtopic: B
- Interactive Exercise (Coding, Multiple Choice, etc)
  - subtopic: C

Structure & flow of lessons

- **Why** (problem):
  - Why am I learning this?
  - What real-world problem is this learning objective attempting to solve?
- **What** (solution):
  - What solution am I going to implement to solve such real-world problem?
- **How** (implementation):
  - How do I implement the solution?
  - Examples

Flow of a Video exercise

- **Problem** (why)
- **Dataset** (what)
- **Technical solution** (what)
- **Solution implementation** (how)

INTERACTIVE COURSE

Machine Learning for Finance in Python

Start Course For Free



4 hours | 15 Videos | 59 Exercises | 5,096 Participants | 5,150 XP

Course Description

Time series data is all around us; some examples are the weather, human behavioral patterns as consumers and members of society, and financial data. In this course, you'll learn how to calculate technical indicators from historical stock data, and how to create features and targets out of the historical stock data. You'll understand how to prepare our features for linear models, xgboost models, and neural network models. We will then use linear models, decision trees, random forests, and neural networks to predict the future price of stocks in the US markets. You will also learn how to evaluate the performance of the various models we train in order to optimize them, so our predictions have enough accuracy to make a stock trading strategy profitable.



Nathan George
Assistant Professor of Data Science at Regis University

1 Preparing data and a linear model FREE

0%

In this chapter, we will learn how machine learning can be used in finance. We will also explore some stock data, and prepare it for machine learning algorithms. Finally, we will fit our first machine learning model -- a linear model, in order to predict future price changes of stocks.

Machine learning for finance	50 xp
Explore the data with some EDA	100 xp
Correlations	100 xp
Data transforms, features, and targets	50 xp
Create moving average and RSI features	100 xp
Create features and targets	100 xp
Check the correlations	100 xp
Linear modeling	50 xp
Create train and test features	100 xp
Fit a linear model	100 xp
Evaluate our results	100 xp

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DataCamp

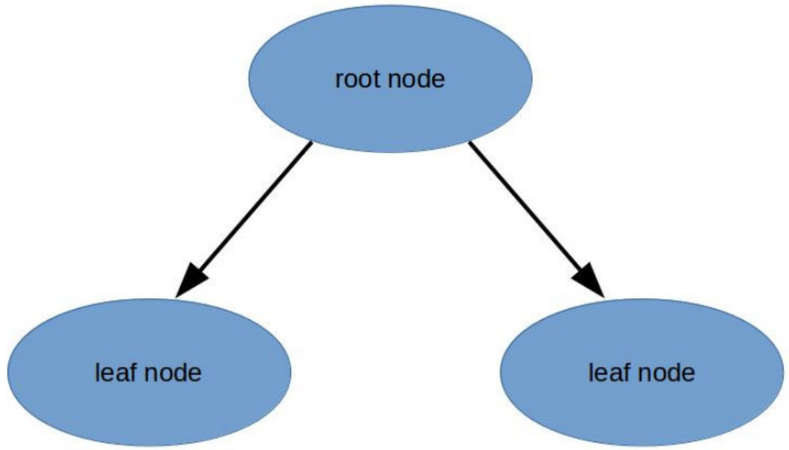
Course Outline

EXERCISE

Fit a decision tree

Random forests are a go-to model for predictions; they work well out of the box. But we'll first learn the building block of random forests -- decision trees.

Decision trees split the data into groups based on the features. Decision trees start with a root node, and split the data down until we reach leaf nodes.



We can use `sklearn` to fit a decision tree with `DecisionTreeRegressor` and `.fit(features, targets)`.

Without limiting the tree's depth (or height), it will keep splitting the data until each leaf has 1 sample in it, which is the epitome of overfitting. We'll learn more about overfitting in the coming chapters.

INSTRUCTIONS 100 XP

- Use the imported class `DecisionTreeRegressor` with default arguments (i.e. no arguments) to create a decision tree model called `decision_tree`.
- Fit the model using `train_features` and `train_targets` which we've created earlier (and now contain day-of-week and volume features).
- Print the score on the training features and targets, as well as `test_features` and `test_targets`.

SCRIPT.PY

```
1  from sklearn.tree import DecisionTreeRegressor
2
3  # Create a decision tree regression model with default arguments
4  decision_tree = ____
5
6  # Fit the model to the training features and targets
7  decision_tree.fit(____)
8
9  # Check the score on train and test
10 print(decision_tree.score(train_features, train_targets))
11 print(decision_tree.score(____))
```

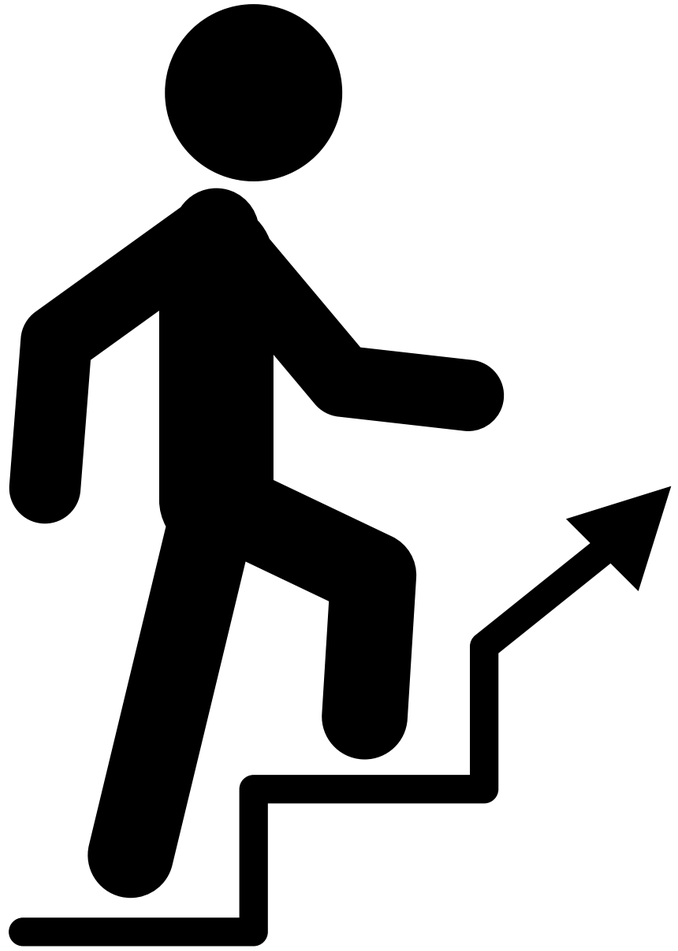
Run Code | Submit Answer

IPYTHON SHELL | SLIDES

```
In [1]:
```

Development flow

- Lesson-by-lesson
- Chronological order
- Accelerates course development
- Ensures narrative progression
- Engages learners



Let's practice!

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Defining learning objectives

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Hillary Green-Lerman
Senior Curriculum Lead

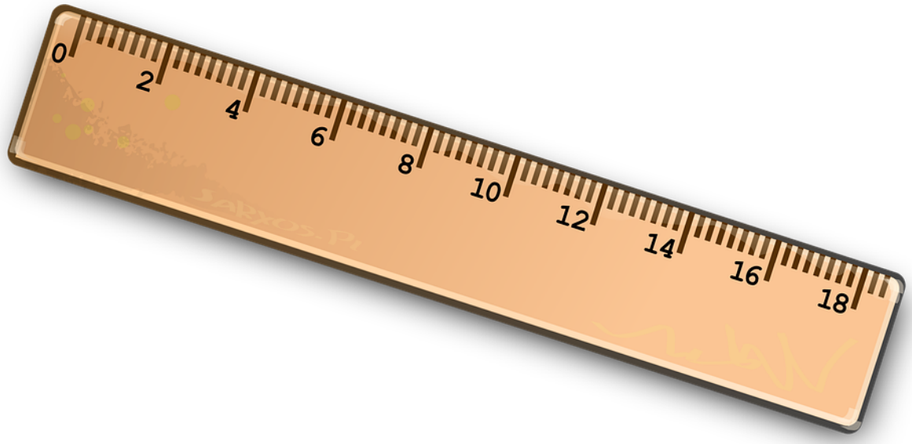
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Clear learning objectives

- States **measurable** outcome
- *"Learner will be able to <verb> ..."*
- Helps you scope your lesson



Measurable learning objectives



Do This	Not That
Learner will be able to create a variable that represents a string	Learner will know what a variable is

Specific learning objectives

- Keep lessons concise and engaging
- Helps DataCamp better assess your course outline

Do This	Not That
Learner will be able to classify sentences as “positive”, “negative”, or “neutral” using NLTK’s sentiment analysis	Learner will perform sentiment analysis

Learning objectives solve a problem

- Motivate each learning objective with a real-world application

Do This	Not That
Learner will be able to construct reusable code blocks using functions	Learner will be able to create functions
Learner will be able to create histograms to compare datasets with similar means, but different distributions	Learner will be able to create histograms

Learning by doing

Theory is nice; practice is better

Do this	Not that
Ask learners to build and fit a linear regression model to a dataset of heights and weights	Ask a multiple choice question about which linear model best fits a dataset
Use scikit-learn to train a decision tree model	Code a decision tree Class from scratch

Expertise & industry insights

- Choose engaging, real-world scenarios

Do this	Not that
Create a histogram based on the radii of different tumors from a Kaggle dataset	Create a histogram based on random numbers generated by a normal distribution

Expertise & industry insights

Do This:

```
# Give variables relevant names

everest_height = 29029
heightest_peaks = ['Mount Everest',
                   'K2',
                   'Kangchenjunga']
```

Not this:

```
# Give variables generic names

foo = 12
my_list = ['item1',
           'item2',
           'item3']
```

Summary

- Write clear, measurable learning objectives
- Encourage learning by doing
- Incorporate expertise and industry experience

Let's practice!

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Optimizing for digital learning

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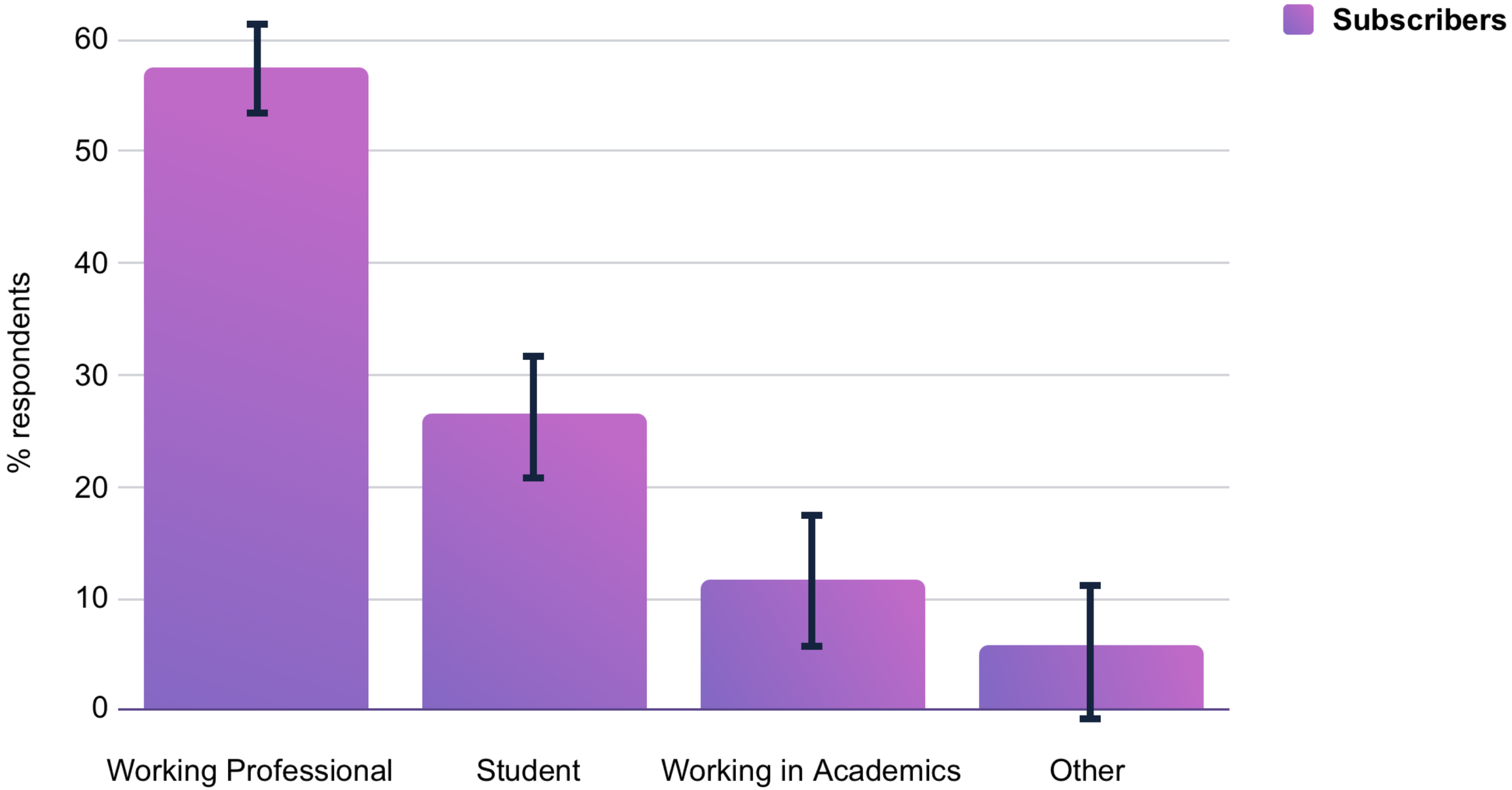


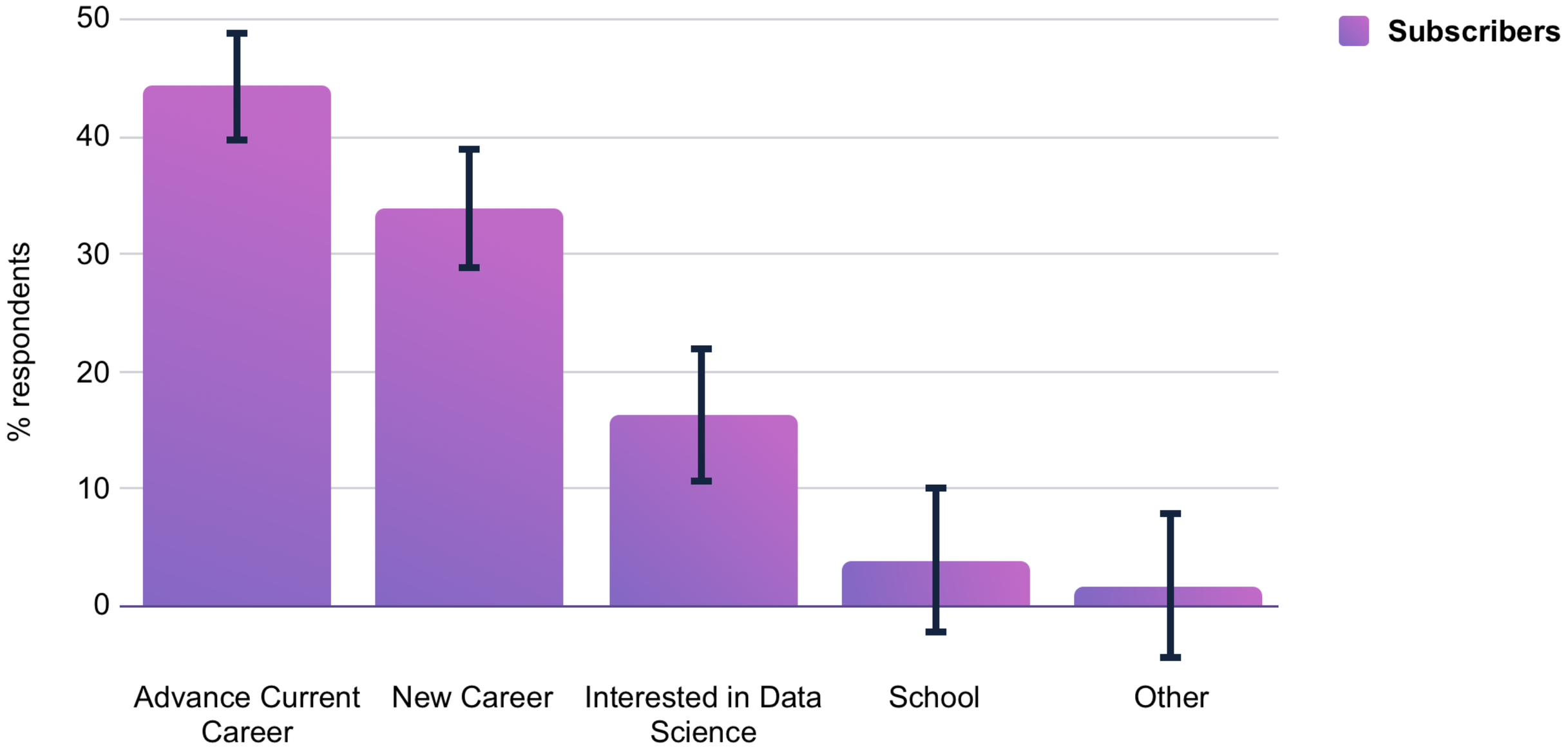
Mona Khalil
Curriculum Lead

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Online vs. offline learning

- One-sided engagement
- Different student demographics
- Student fit learning around busy schedule


Subscribers
% respondents
60
50
40
30
20
10
0
Working Professional
Student
Working in Academics
Other


Subscribers
% respondents
50
40
30
20
10
0
Advance Current Career
New Career
Interested in Data Science
School
Other

Biomedical Image Analysis in Python

The field of biomedical imaging has exploded in recent years - but for the uninitiated, even loading data can be a challenge! In this introductory course, you'll learn the fundamentals of image analysis using NumPy, SciPy, and Matplotlib. You'll navigate through a whole-body CT scan, segment a cardiac MRI time series, and determine whether Alzheimer's disease changes brain structure. Even if you have never worked with images before, you will finish the course with a solid toolkit for entering this dynamic field.

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Biomedical Image Analysis in Python

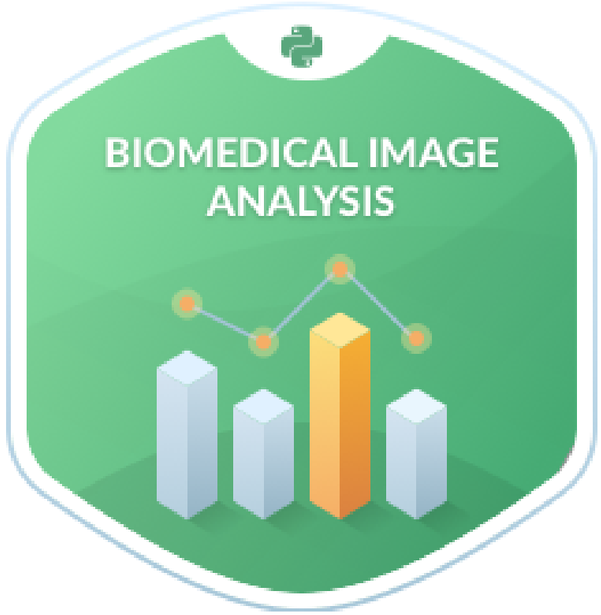
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Prerequisites

- Identify learners with optimal qualifications
  - Select 1 - 3 prerequisites
  - Introductory courses may have fewer
  - Case studies and advanced courses may have more



PREREQUISITES

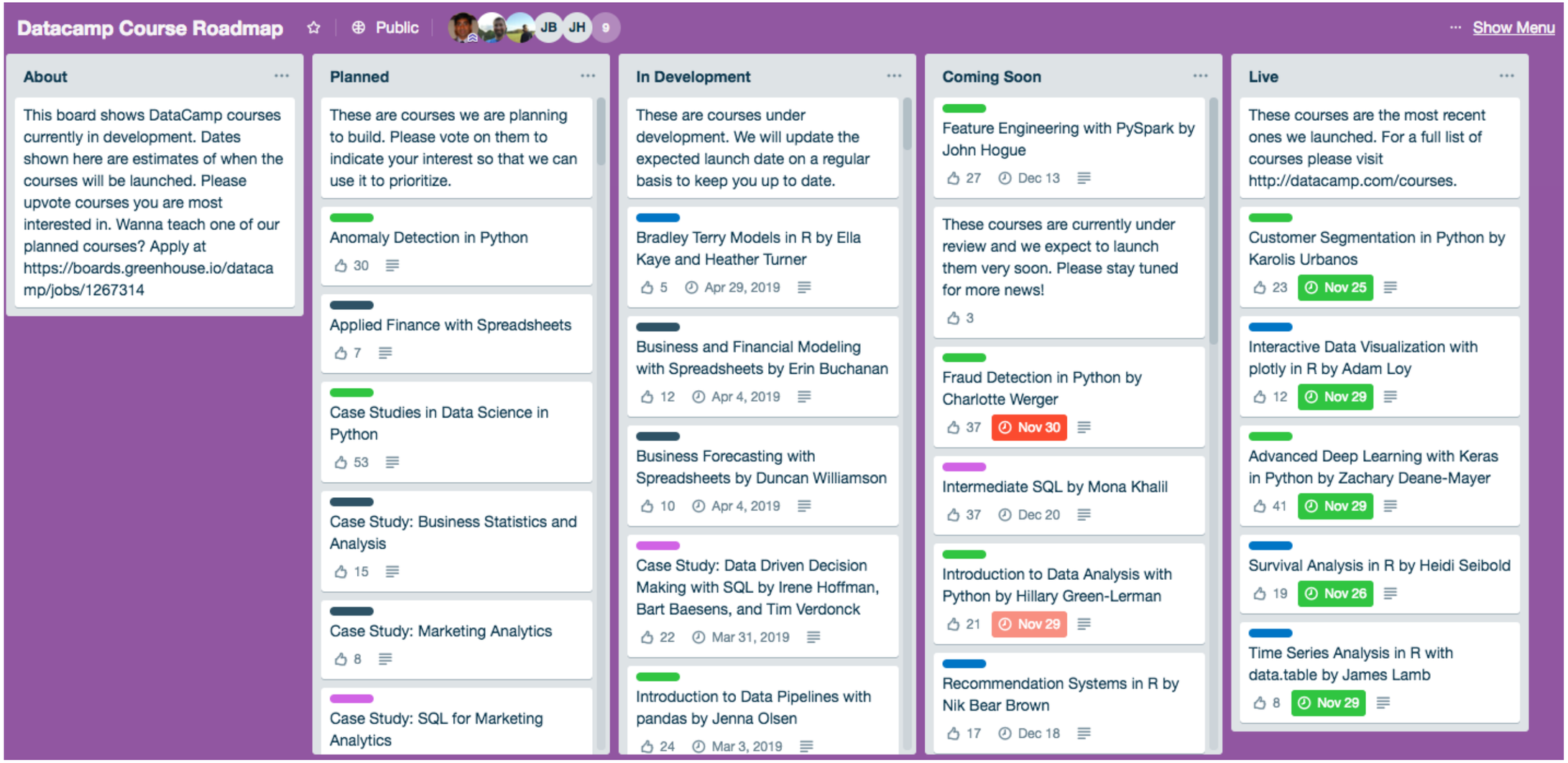
- Intermediate Python for Data Science



PREREQUISITES

- Introduction to the Tidyverse
- Spatial Analysis in R with sf and raster

- **Course Roadmap**



Analogy: a similarity or comparison between two objects



> *R packages are like apps, and CRAN is like the App Store.*

Heuristic: a mental shortcut that eases the cognitive load of information



Signal and noise - It's like trying to hear someone across a crowded room. Remove the noise and you can understand easily what they are telling you.

Let's practice!

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Excitement is contagious!

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Adrián Soto
Content Developer

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Your best teachers

What are their characteristics?

- Knowledgeable and well-prepared
- Patient and willing to help
- Able to turn difficult things into simple things
- Effective at communication
- Engaging and interactive
- Excited and enthusiastic

Your best teachers

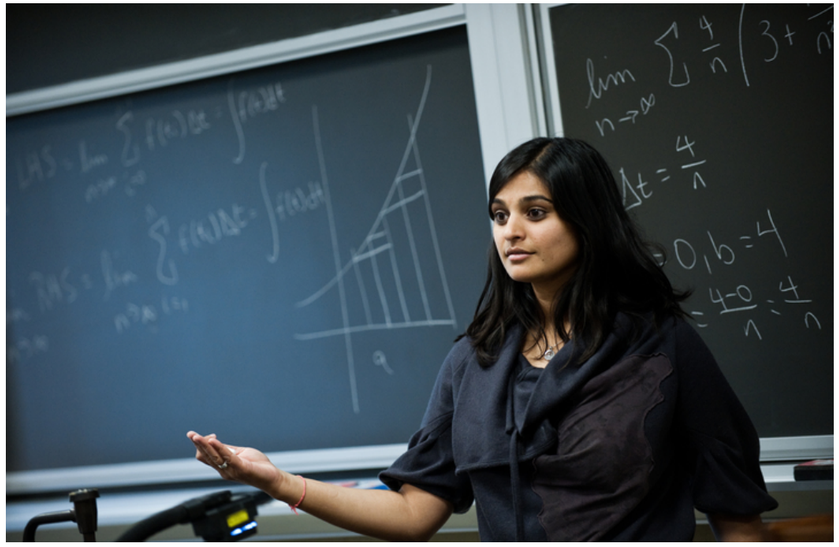
What are their characteristics?

- Knowledgeable and well-prepared
- Patient and willing to help
- Able to turn difficult things into simple things
- Effective at communication
- **Engaging and interactive**
- **Excited and enthusiastic**

Why do you remember them?

Whether it was your best primary school teacher...





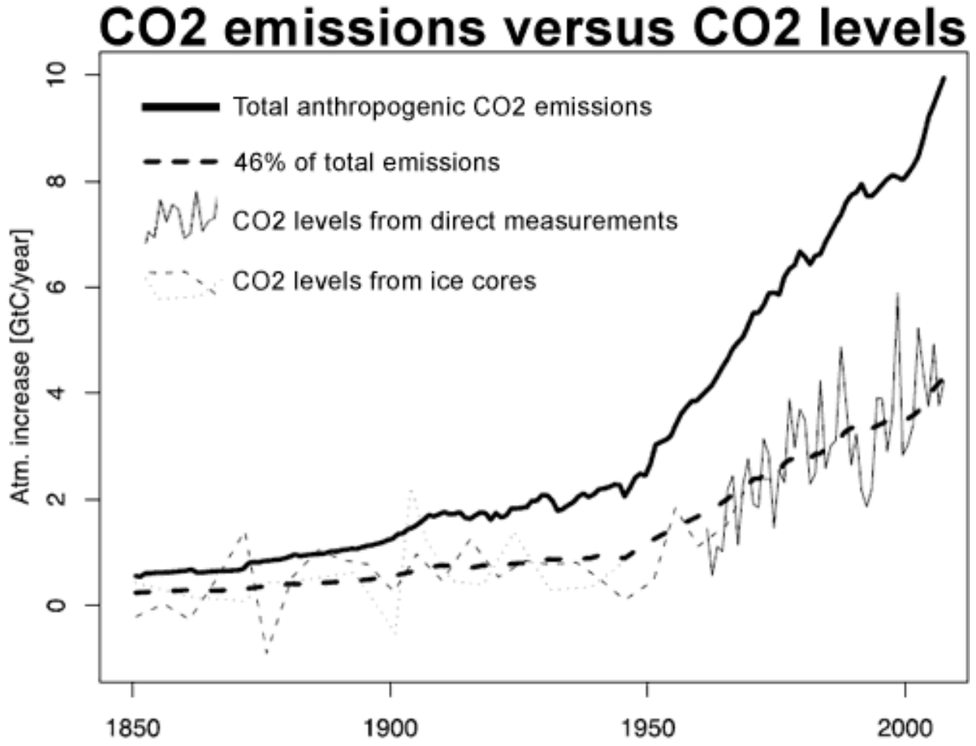
... or your favorite grad school professor

General devices

- Use compelling examples
  - DataCamp students love real-life applications!
- Be curious. Invite students to join
- Use interesting datasets
- Use alluring titles
  - for slides
  - for exercises
  - for chapters

Videos: Some tricks

- Motivate your materials around the "why"



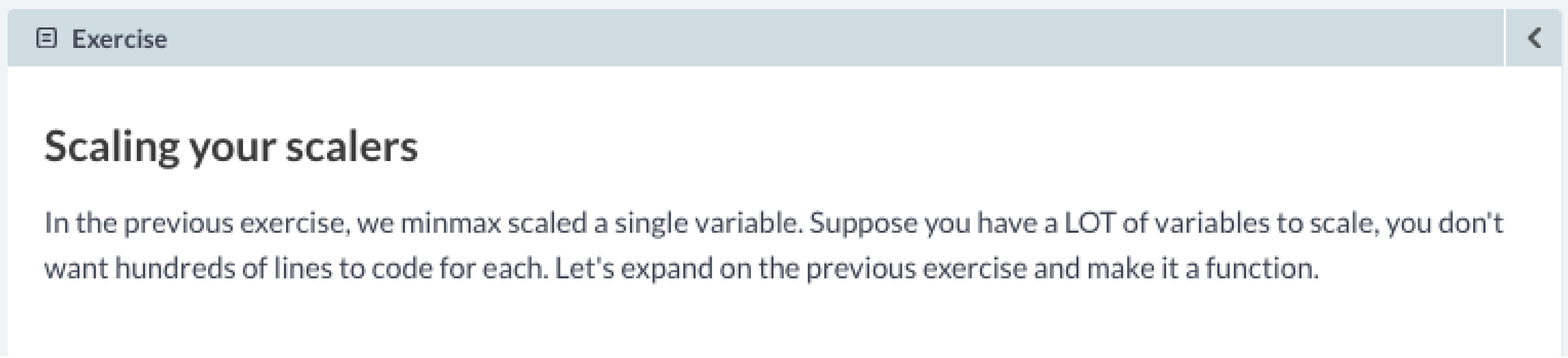
Source: Knorr 2009

Videos: Some tricks

- Motivate your materials around the "why"
- Congratulate students for their success
- Ask questions
- Tell stories!
- It's okay to be funny
- Invite students to practice
- Sound enthusiastic!

Exercises: Motivation

- Motivate exercise usefulness



Exercises: Hints

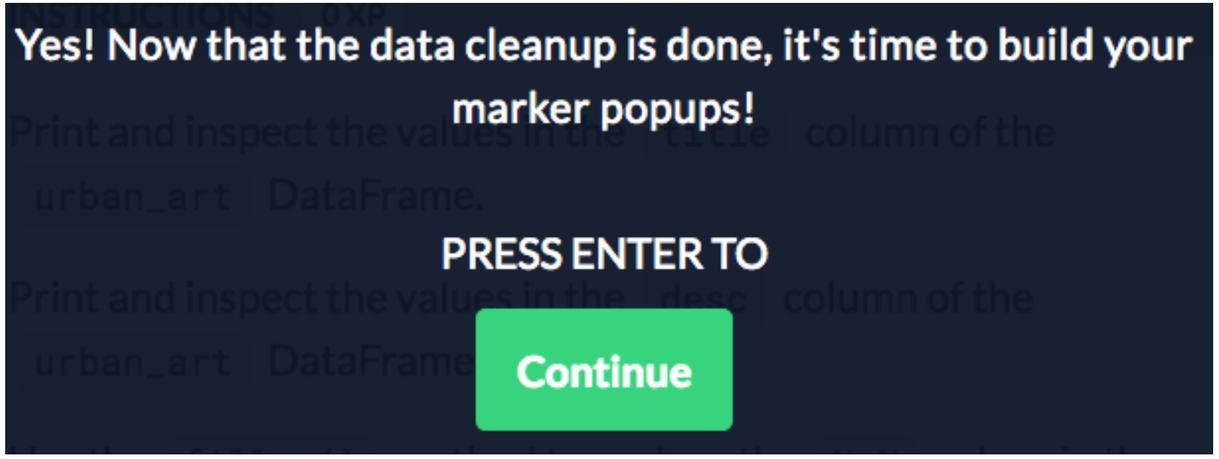
- No room for condescendence
- Keep a positive tone

HINT

Do you remember how you updated your `reserve_date` column? You can use the very same trick with `flight_date` !

Exercises: Success messages

- Praise, but not too much
- Highlight interesting outcomes or findings



Exciting times!

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