iterative

Course Introduction

Lesson 1

DVC tools for Data Scientists & Analysts

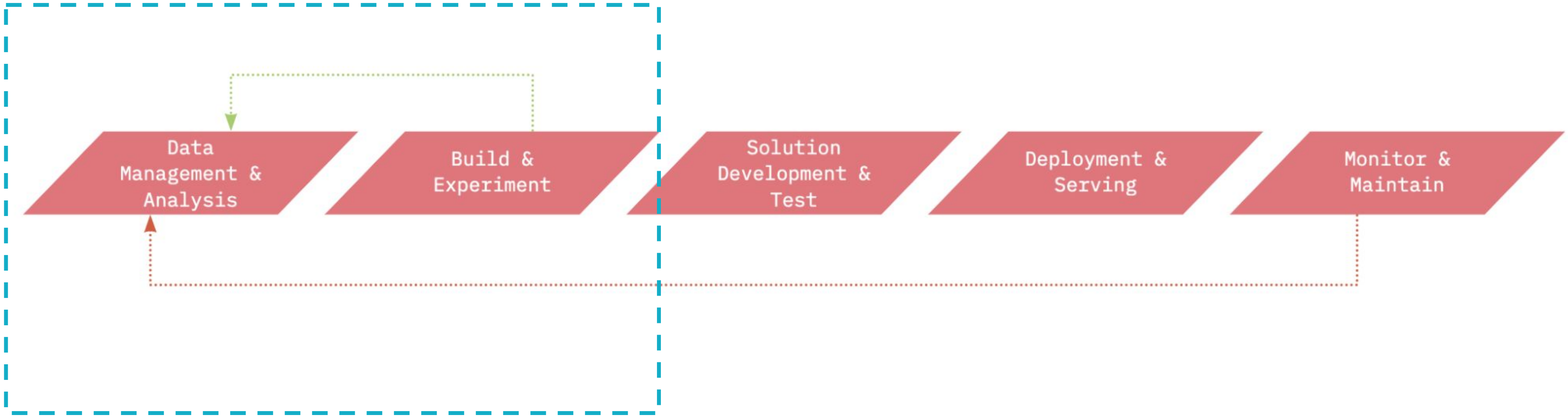
2021

Lesson Outline

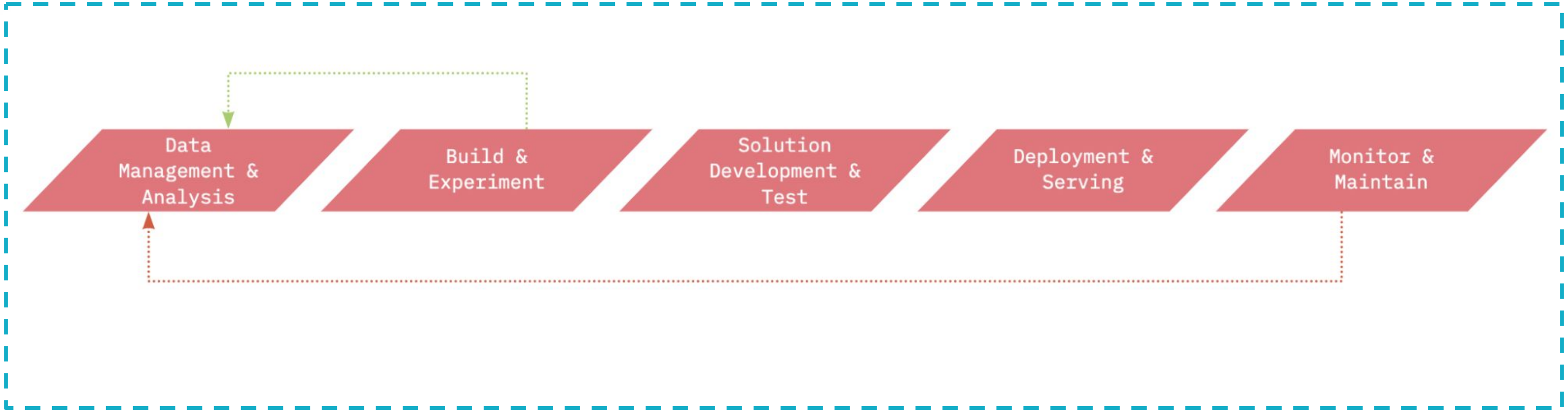
- Motivation
- What is DVC?
- What is DVC Studio?
- Course objectives
- Course structure

Motivation

Machine Learning Workflow



Machine Learning Workflow



Common DS/ML Issues

- Difficult sharing & collaborating
- Inefficiency & work duplication
- Slow updates
- Pipelines not reliable or reproducible
- Data quality issues
- Model metrics tracking

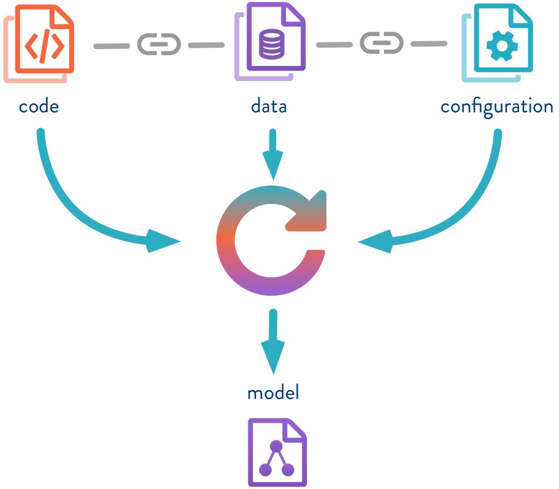
Good practices for ML projects

1. **Project structure & dev environment**
   - Organize a project repository
   - Environment dependencies control
2. **Coding (software development)**
   - Follow style-guides
   - Code version control (Git)
3. **Documentation & task tracking**
   - Document your code, experiments, and findings
   - Task tracking
4. **ML pipelines development & experiments**
   - Automated pipelines
   - Control run params
   - Models and artifacts version control
   - Experiment results tracking
   - Reproducible experiments

What is DVC?

What is DVC?

- Platform to manage machine learning experiments and pipelines
- Tool for data and model versioning
- Data access, sharing and collaboration tool
- Link between your code and data

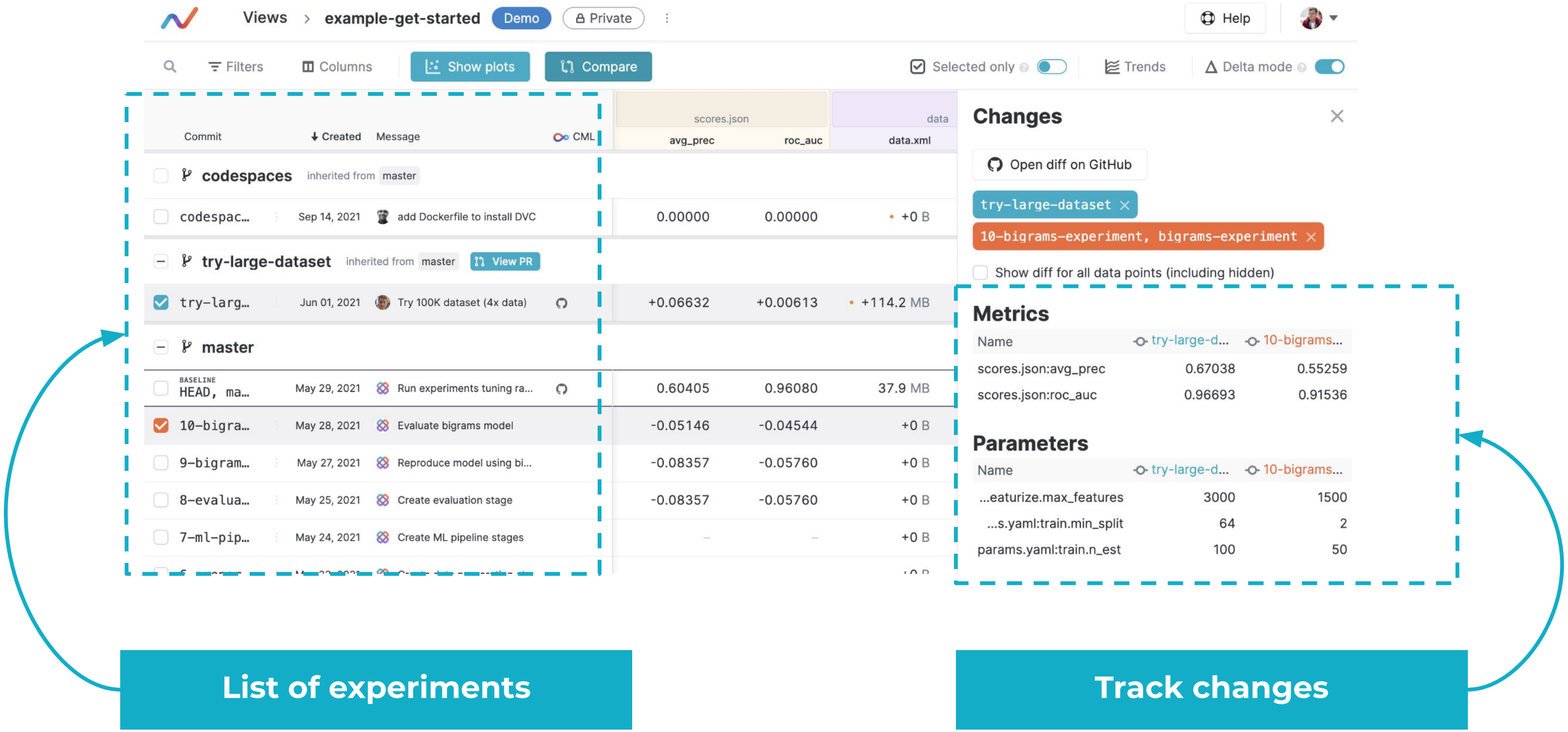


DVC Team

Welcome video

What is DVC Studio?

Studio: UI for ML experiments and metrics tracking



				scores.json		data
Commit	Created	Message	CML	avg_prec	roc_auc	data.xml
codespaces inherited from master						
□ codespac…	Sep 14, 2021	add Dockerfile to install DVC		0.00000	0.00000	+0 B
try-large-dataset inherited from master						
☑ try-larg…	Jun 01, 2021	Try 100K dataset (4x data)		+0.06632	+0.00613	+114.2 MB
master						
□ BASELINE HEAD, ma…	May 29, 2021	Run experiments tuning ra…		0.60405	0.96080	37.9 MB
☑ 10-bigra…	May 28, 2021	Evaluate bigrams model		-0.05146	-0.04544	+0 B
□ 9-bigram…	May 27, 2021	Reproduce model using bi…		-0.08357	-0.05760	+0 B
□ 8-evalua…	May 25, 2021	Create evaluation stage		-0.08357	-0.05760	+0 B
□ 7-ml-pip…	May 24, 2021	Create ML pipeline stages		–	–	+0 B

Changes

□ Show diff for all data points (including hidden)

Metrics

Name	try-large-d...	10-bigrams...
scores.json:avg_prec	0.67038	0.55259
scores.json:roc_auc	0.96693	0.91536

Parameters

Name	try-large-d...	10-bigrams...
...eaturize.max_features	3000	1500
...s.yaml:train.min_split	64	2
params.yaml:train.n_est	100	50

List of experiments

Track changes

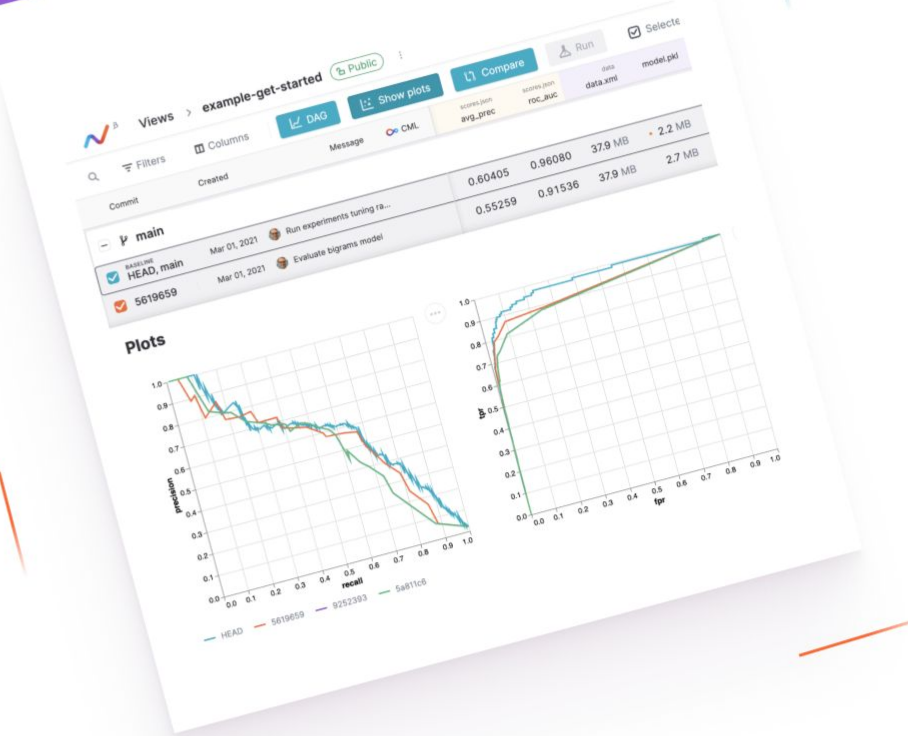
DVC Studio Team

Welcome video

Course objectives

Course objectives

1. Improve ML experimenting & development processes
2. Bring good engineering practices into ML
3. Improve team collaboration
4. Learn & integrate tools for ML projects

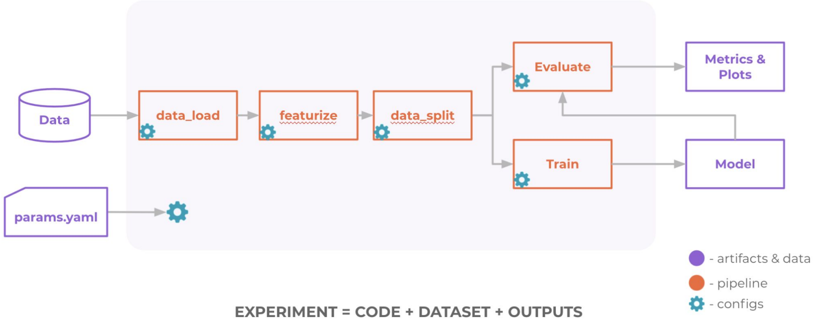


Commit	Created	Message	avg_prec	roc_auc	data.xml	model.pkl
main						
☑ BASELINE HEAD, main	Mar 01, 2021	Run experiments tuning ra...	0.60405	0.96080	37.9 MB	2.2 MB
☑ 5619659	Mar 01, 2021	Evaluate bigrams model	0.55259	0.91536	37.9 MB	2.7 MB

What will you learn?

How to...

1. Build automated pipelines and reproducible experiments

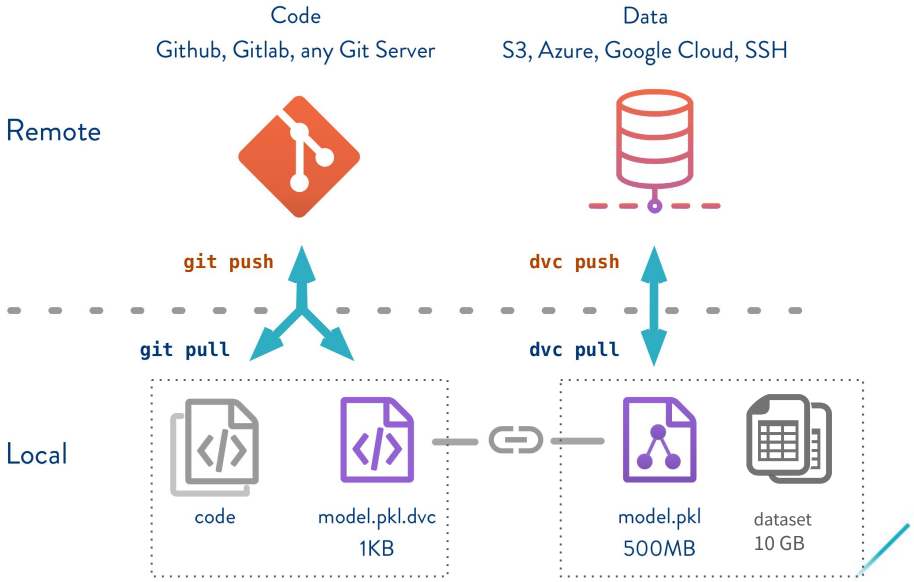


EXPERIMENT = CODE + DATASET + OUTPUTS

What will you learn?

How to...

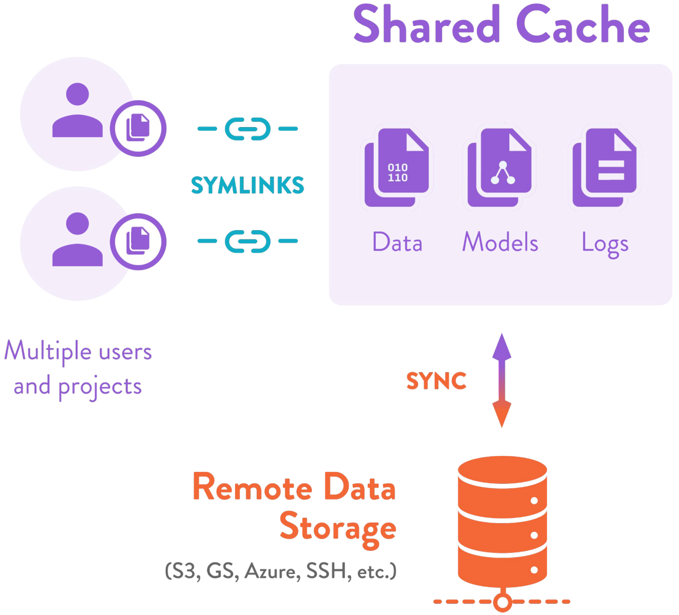
1. Build automated pipelines and reproducible experiments
2. Manage data and model versioning



What will you learn?

How to...

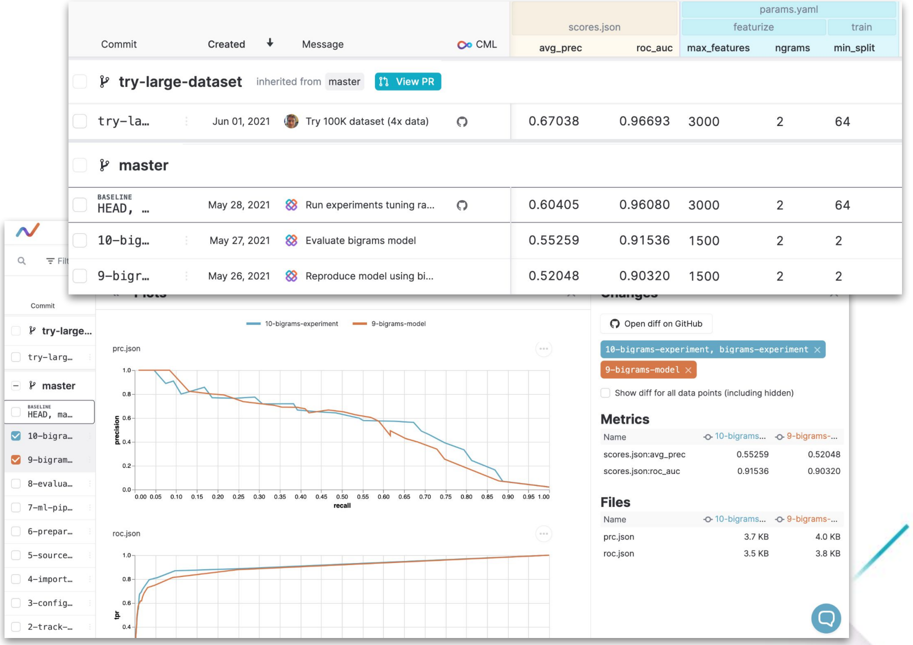
1. Build automated pipelines and reproducible experiments
2. Manage data and model versioning
3. Organize your project code and team collaboration



What will you learn?

How to...

1. Build automated pipelines and reproducible experiments
2. Manage data and model versioning
3. Organize your project code and team collaboration
4. Visualize metrics & collaborate on ML experiments



				scores.json		params.yaml		
						featurize		train
Commit	Created ↓	Message	CML	avg_prec	roc_auc	max_features	ngrams	min_split
try-large-dataset inherited from master View PR								
try-la…	Jun 01, 2021	Try 100K dataset (4x data)		0.67038	0.96693	3000	2	64
master								
BASELINE HEAD, …	May 28, 2021	Run experiments tuning ra…		0.60405	0.96080	3000	2	64
10-big…	May 27, 2021	Evaluate bigrams model		0.55259	0.91536	1500	2	2
9-bigr…	May 26, 2021	Reproduce model using bi…		0.52048	0.90320	1500	2	2

Commit
try-large…
□ try-larg…
master
BASELINE HEAD, ma…
☑ 10-bigra…
☑ 9-bigram…
□ 8-evalua…
□ 7-ml-pip…
□ 6-prepar…
□ 5-source…
□ 4-import…
□ 3-config…
□ 2-track-…

□ Show diff for all data points (including hidden)

Metrics

Name	10-bigrams…	9-bigrams-…
scores.json:avg_prec	0.55259	0.52048
scores.json:roc_auc	0.91536	0.90320

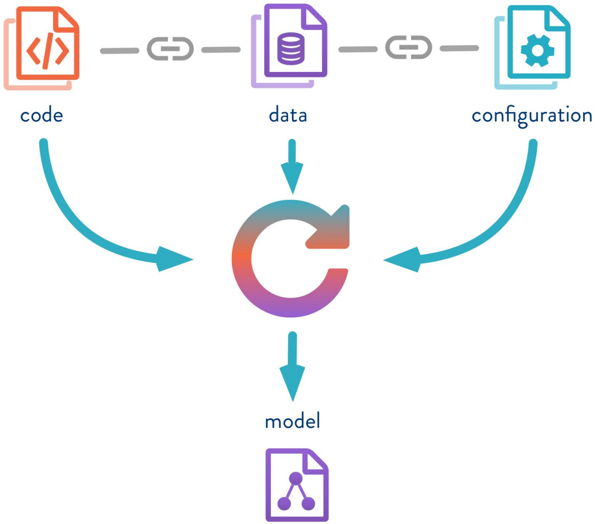
Files

Name	10-bigrams…	9-bigrams-…
prc.json	3.7 KB	4.0 KB
roc.json	3.5 KB	3.8 KB

What will you learn?

How to...

1. Build automated pipelines and reproducible experiments
2. Manage data and model versioning
3. Organize your project code and team collaboration
4. Visualize metrics & collaborate on ML experiments
5. Integrate DVC and DVC Studio into your own project



Course structure

Course lessons

Lesson 1. Course Introduction

Lesson 2. Practices and Tools for Efficient Collaboration in ML Projects

Lesson 3. Pipeline Automation and Configuration Management

Lesson 4. Versioning Data and Models

Lesson 5. Visualizing Metrics & Comparing Experiments with DVC and Studio

Lesson 6. Experiment Management and Collaboration

Lesson 7. Tools for Deep Learning

Lesson 8. Review of Advanced Topics and Use Cases

Course content and tools

Format

- Video lectures with slides
- Code examples and demos
- Discussions in Discord

Tools

- Jupyter Notebooks
- Python
- Git
- DVC
- DVC Studio

Important Prerequisites

Skills

- Basic knowledge of Python
- Basic CLI
- Basic Git

System

- Software: Python, Git, Docker, DVC
- ~ 1 GB disk space
- min 4 GB RAM is recommended

Checklist before take-off

1. Python installed
2. Python packages: pip, virtualenv
3. Git installed
4. Registered at the class Discord channel
5. **Say Hello** to the class and share your expectations of this course

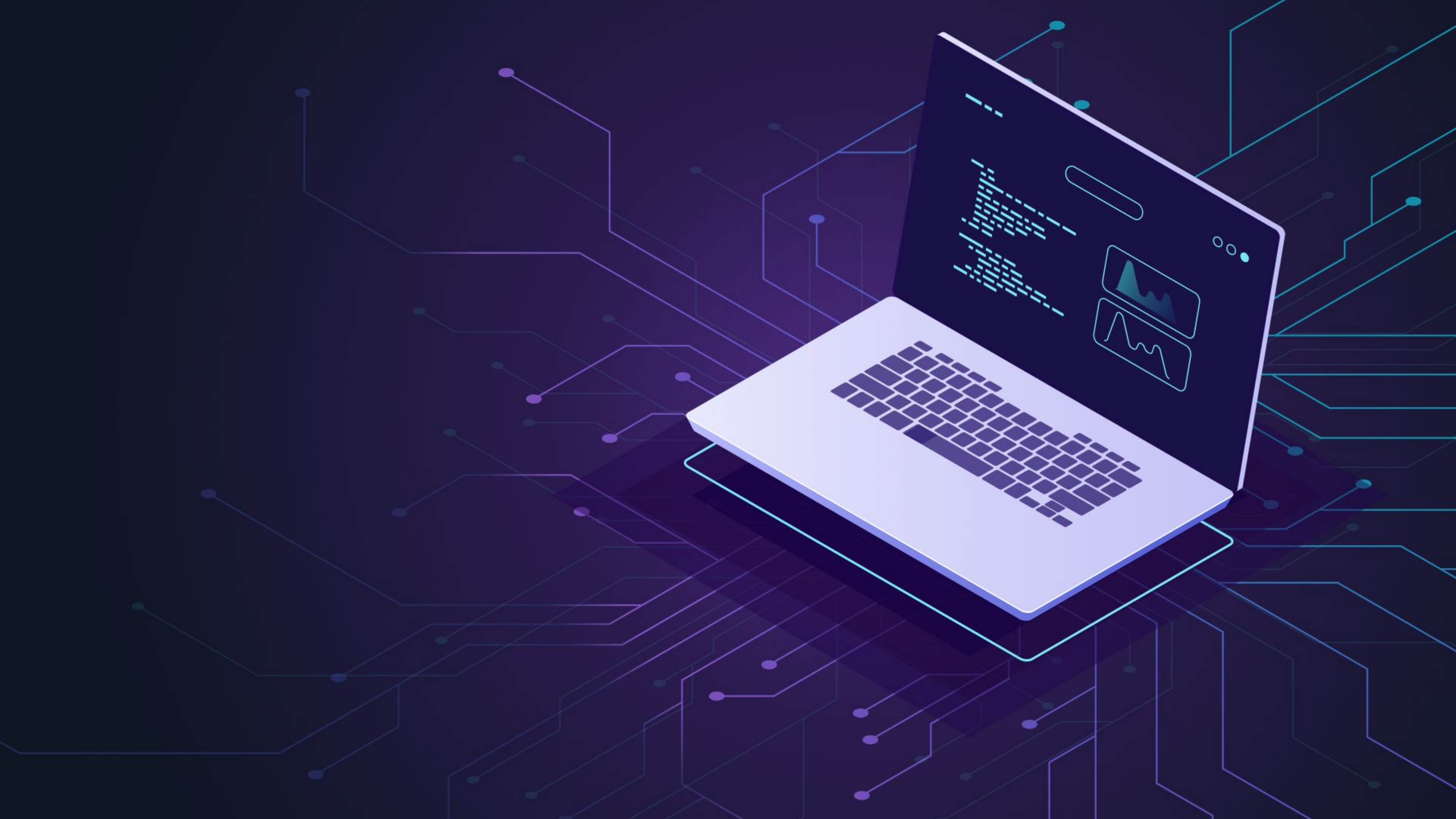
Demo

Where to find more material, useful links, and Discord channel

What have we learned?

What have we learned?

1. Course objectives and structure
2. What is DVC
3. What is DVC Studio



Links

- Data Science blueprint
  https://data-science-blueprint.readthedocs.io/en/latest/presentation/schema.html