

Discrete Structures: Setting Up Projects CMPSC 102

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Fall 2022
Week 5
Slides 01

Let's Discuss

Discrete
Structures:
Setting Up
Projects
CMPSC 102

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Let's Discuss

Virtual
Environments

Venv Project
Setup
Executing
Black

Another
Virtual
Environment

New Poetry
Project
Test
Execute Project

Key Questions

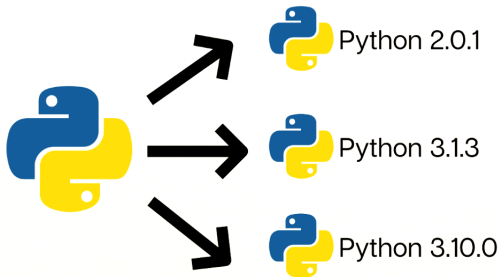
How do I use virtual environments like Venv, Poetry, Typer and other resources to create a professional project?

Learning Objectives

To learn how to use libraries and dependencies for development with Python code and programming techniques to create the foundations for a professional project.

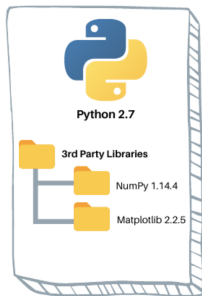
Virtual Environments

- Projects' dependencies and specific versions of libraries.
- Not all projects require the same dependencies; How do you mix projects on your computer?

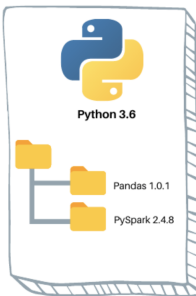


Go Virtual

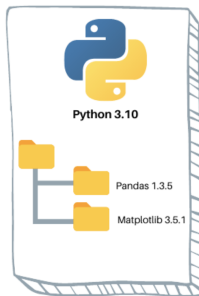
Virtual Environment 1



Virtual Environment 2



Virtual Environment 3



- Virtual environments maintain specific libraries and dependencies projects
- Shipping software: build an exact copy of development environment on client's machine to use software.

Regression Analysis Project

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- Decide on the purpose and composition of the project
 - Our project: a regression analysis demonstration from SciKit-Learn
 - https://scikit-learn.org/stable/supervised_learning.html#supervised-learning
 - No command line parameters
 - No output, other than screen printing
 - Execution: Program complete regression analysis of random values
 - One function in project: `main()`
 - **Dependencies:** scikit-learn, numpy, seaborn

Setting Up Virtual Environment

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Create a project directory

```
mkdir projects  
cd projects
```

Create virtual environment using Python

```
python3 -m venv myenv  
# see the file tree  
find . -not -path '*/\.*'
```

Activate *myenv* the virtual environment

```
source myenv/bin/activate
```

Install Dependencies

```
pip install numpy  
pip install seaborn  
pip install sklearn  
#or try: pip install scikit-learn
```

Output From Executing the Script

Execute given Script in *myenv*

```
python3 sciKitDemo.py
```

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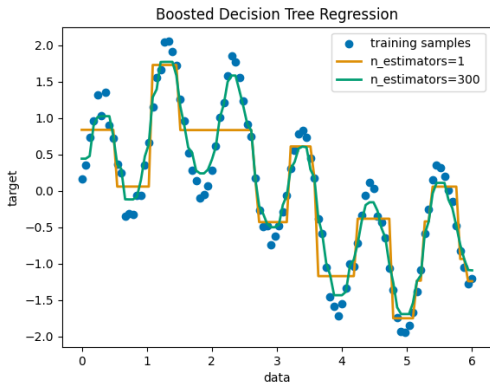
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Black: a Python Script *formatter*

Got Clutter?

- How to maintain *readable* code?
- How to reduce white-space in code to improve readability?



- A code formatting resource
- https://black.readthedocs.io/en/stable/getting_started.html

Black: a Python Script *formatter*

Install Dependencies

```
pip install black
```

Linting example: Standard Input

```
echo "print ( 'hello, world' )" | black -
```

Linting example: As a String

```
black --code "print ( 'hello, world' )"
```

https://black.readthedocs.io/en/stable/usage_and_configuration/the_basics.html

We will use this with Poetry (up next)

A *Bigger* Virtual Environment

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Use a New Terminal



PYTHON PACKAGING AND DEPENDENCY MANAGEMENT MADE EASY

Poetry

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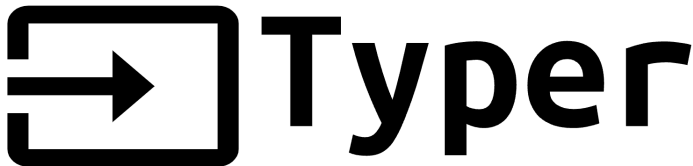
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<https://typer.tiangolo.com/>

Typer

- Command line interface support for program inputs and parameters
- Annotations: assigns types to functions that accept arguments (parameters)
- Productivity: types aid in the creation of the interface
- Checking: Confirm that inputs match expected types.

PYTHON PACKAGING AND DEPENDENCY MANAGEMENT MADE EASY

Poetry

<https://python-poetry.org/>

Poetry

- Management support for Python and its resources
- Environments: manage dependencies in isolation
- Package: create a stand-alone executable application
- Publish: expedite and simplify the release of program to PyPI

A Hello User Program

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- Decide on the purpose and composition of the project
 - Our project: Say hello to the user
 - Parameters `firstName`, `middleName` and `lastName` as parameters
 - No output, other than screen printing
 - Execution: Program greets user by full name
 - One function in project: `main()`

Setup Steps

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Make a working directory

```
mkdir projects  
cd projects
```

Use Poetry to create new project

```
poetry new hello_user  
cd hello_user
```

Add Project Dependencies

```
poetry add typer  
poetry add rich
```

Add Project Development Dependencies

```
poetry add -D black mypy
```

Mypy: <http://mypy-lang.org/>

Setup Steps

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Add File: projects/hello_user/hello_user/__init__.py

```
"""Required docstring for an __init__ file."""  
  
__version__ = "0.1.0"
```

Add File: projects/hello_user/pyproject.toml

```
[tool.poetry] ...  
  
[tool.poetry.scripts]  
hello_user = "hello_user.main:cli"  
  
[tool.poetry.dependencies] ...
```

Update Poetry

```
poetry install
```

Add File: projects/hello_user/hello_user/main.py

File located in sandbox: main.py

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```
#!/usr/bin/env python3
# -*- coding: utf-8 -*-
from rich.console import Console
import typer

# create a Typer object to support the command-line interface
cli = typer.Typer()
@cli.command()
def main(first: str = "", middle: str = "", last: str = ""):
    """Say hello to the person having a name
    of first, middle and last name"""
    console = Console()
    console.print("Hello to;")
    console.print(f"    first = {first}")
    console.print(f"    middle = {middle}")
    console.print(f"    last = {last}")
# end of main()
```


Basic Reformatting with Black

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Test
Execute Project

```
poetry run black hello_user tests
```

```
obonhamcarter@MacBookPro-2017 hello_user % poetry run black hello_user tests
reformatted hello_user/main.py
```

```
All done! ✨ 🍰 ✨
```

```
1 file reformatted, 2 files left unchanged.
```

Execute Project

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What do you see?

```
# run from projects/hello_user
poetry run hello_user --help
```

```
obonhamcarter@MacBookPro-2017 hello_user % poetry run hello_user --help
```

Usage: hello_user [OPTIONS]

Say hello to the person having a name of first, middle and last name

Options

--first	TEXT	
--middle	TEXT	
--last	TEXT	
--install-completion	[bash zsh fish powershell pwsh]	Install completion for the specified shell. [default: None]
--show-completion	[bash zsh fish powershell pwsh]	Show completion for the specified shell, to copy it or customize the installation. [default: None]
--help		Show this message and exit.

Execute Project

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What do you see?

```
# run from projects/hello_user  
poetry run hello_user
```

Without parameters

```
poetry run hello_user  
Hello to;  
    first =  
    middle =  
    last =
```

Execute Project

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What do you see?

```
# run from projects/hello_user
poetry run hello_user
    --first Darth
    --middle Cornelius
    --last Vader
```

With parameters

```
Hello to;
    first = Darth
    middle = Cornelius
    last = Vader
```