

Creating new variables by calculation in Python (Part 2)

This planning document is intended to support teachers who are delivering the NPA/PDA Data Science or for students who are learning independently. It also aligns with the Data Skills for Work framework.

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Lesson Description

Lesson Overview	<p>Creating new calculated variables, where the calculation that is used is conditional</p> <p>This lesson follows from Part 1, which addressed the creation of simple new variables, where the calculation that is used to create the variable is the same for each row in the dataset.</p>
Topic	Data manipulation
Book Chapter(s)	“Data Transformation and Manipulation”

NPA level	5, 6
PDA level	7, 8

Lesson Contents

This lesson consists of:

- A lesson plan (this document)
- A Powerpoint presentation, 'Creating new variables by calculation in Python'
- Jupyter notebooks:
 - 'creating_variables_by_calculation_with_answers_part_2.ipynb' (for teachers), and
 - 'creating_variables_by_calculation_part_2.ipynb' (for learners)
- Datasets used in the Jupyter notebooks: the datasets are stored online and imported by the Jupyter notebooks.

Learning Intentions

In this lesson, we will be learning how to create new variables in Python, specifically to,

- understand the **concept of conditional statements** for creating new variables.
- how to create new variables using conditional statements in Python.

Success Criteria

I can *describe* how to create a new variable by performing calculations.

I can *create* new variables in Python by performing calculations.

I can *describe* the concept of conditional statements.

I can *create* new variables *using* conditional statements in Python.

Knowledge Prerequisites

Learners should know:

- Data is held in structured data frames
- Python is a programming language that can be used for data analysis
- How to open a csv file in a Jupyter notebook

- How to use a Jupyter notebook to write, edit and run Python code

Lesson Requirements

	PDA	NPA	Data Skills for work
Qualification	Yes	Yes	Yes
Outcome ID(s)	WD8.3b, WD8.3c, CD8.1g, WD7.2a, WD7.2b, CD7.3a	DS5.2c, DS5.3c, DS6.2b, DS6.3c	C2.1, A1.2, A2.3
Outcome description(s)	<p>WD8.3b Types of data transformation</p> <p>WD8.3c Transformations</p> <p>CD8.1g Preparing data for visualisation</p> <p>WD7.2a Types of data transformation</p> <p>WD7.2b Common transformations including filtering, sorting</p> <p>CD7.3a Preparing data for visualisation</p> <p><i>N.B. out of scope of this lesson,</i></p> <p><i>“WD8.3c ... including joins”</i></p> <p><i>“WD7.2bcombining, separating and grouping”</i></p>	<p>DS5.2c Describe methods of cleaning and transforming data</p> <p>DS5.3c Perform routine data cleaning and structuring.</p> <p>DS6.2b Explain techniques for data capture, cleaning and transformation including data modelling</p> <p>DS6.3c Perform data transformation to complete, correct and structure data</p> <p><i>N.B. out of scope of this lesson,</i></p> <p><i>“DS5.3d ...including sort, filter..., group and summarise.”</i></p>	<p>C2.1 Vocabulary used in data science and analytics</p> <p>A1.2 Data quality</p> <p>A2.3 Data calculation and manipulation</p> <p><i>N.B. out of scope of this lesson “A1.1....quantitative and qualitative”</i></p>
Level	7, 8	5, 6	Core, Analysis
Software language	Python	Python	Python

Required equipment /software for student	Lesson: PowerPoint	Lesson: PowerPoint	Lesson: PowerPoint
	Python notebook: Jupyter notebook environment	Python notebook: Jupyter notebook environment	Python notebook: Jupyter notebook environment

Jupyter Notebook

There is a Jupyter notebook for this lesson that provides examples and programming tasks for learners, drawn from the examples in the lesson Powerpoint.

The notebook uses Python 3.x and the following packages:

- [pandas](#) - for data manipulation
- [s3fs](#) - an API to AWS S3 (Simple Storage Service), used to import datasets

The notebooks can be used with any Jupyter notebook environment. The tasks are described in the table below.

Notebook section	Task	Description
Conditionally Create a New Variable By Performing a Calculation on Existing Variables	Task 1 - It Pays to be Loyal	Create a variable whose numeric value depends on the value of another numeric variable.
	Task 2 - Do You Run at the Weekend?	Create a variable whose Boolean value depends on the numeric value of another (numeric) variable.

Datasets

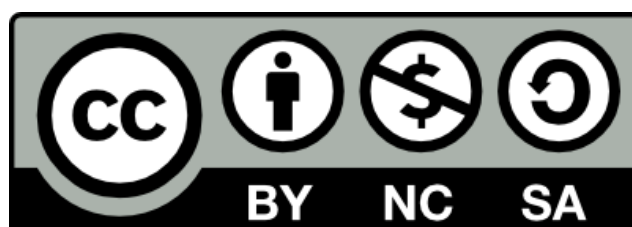
The following datasets are used in this lesson.

Dataset name	Description	Link
Gym staff	The name, start date and leaving date of members of gym staff.	https://datasets.learn-data.science/gym_staff.csv
Sports clubs	Information about local sports clubs.	https://datasets.learn-data.science/archery.csv

How you can use this lesson

This lesson has been created by Effini in partnership with Data Education in Schools, The Data Lab and Data Skills for Work, with funding from the Scottish Government.

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