

## Lesson title: MACHINE LEARNING IN PYTHON

**Duration: 14 school hours**

**Age of students: 16-18 years**

### 1 Educational outcomes

- distinguish artificial intelligence from machine learning,
- distinguish types of machine learning,
- apply basic functions for data processing in Python,
- recognize the importance of data collection and model creation based on data analysis,
- create a machine learning program in Python.

### 2 Implementation activities

**The exercise is carried out through 5 activities, which are described below:**

#### 2.1 Differences between artificial intelligence and machine learning (1 hour)

Description: After the introductory presentation, the students discuss what artificial intelligence and machine learning are and determine the differences between them. They explore examples of different types of machine learning.

**Digital content:** Presentation

#### 2.2 Basic functions for working with data in Python (2 hours)

**Description:** Through example demonstrations, students consider the basic functions they can use to process data in Python. They solve the examples independently (they look for the average value, the value in the middle of the array of ordered values, standard deviation and percentiles).

**Digital content:** Presentation and examples in Python

## 2.3 Data collection and analysis in machine learning (2 hours)

**Description:** Using ready-made examples, students determine the importance of data collection, analyse them and choose the appropriate model.

**Digital content:** Presentation and examples in Python

## 2.4 Creating example by students (4 hours)

**Description:** Students collect data, select the appropriate model (depending on more than one variable) and create their own program in Python.

## 2.5 Analysis of more complex examples of machine learning in Python (5 hours)

**Description:** Students collect their own data and perform more complex examples of machine learning. They present the results.

**Note:** It is recommended to divide students into groups (teams).

**Digital content:** Examples of machine learning in Python.

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### 1) Recognition of sanctions (good/bad)

The example recognizes positive and negative sanctions in sentences. It uses a logistic regression algorithm for text analysis.

**Description:** <http://www.green-stem.eu/wp-content/uploads/2023/09/Recognizing-sanctions.pdf>

### 2) Writing poems (songs)

The example applies machine learning (neural networks) to create songs from titles at letter level (letter by letter) on a sample of songs by Dragutin Tadijanović, Fran Krste Frankopan and Antun Gustav Matoš.

**Description:** <http://www.green-stem.eu/wp-content/uploads/2023/09/Writing-Songs.pdf>

### 3) Face recognition

The example applies machine learning to analyse facial images, recognize key features, and draw conclusions about several aspects of the depicted person.

**Description:** <http://www.green-stem.eu/wp-content/uploads/2023/09/Face-recognition.pdf>

## 3 Digital content

### 3.1 Presentation.pdf

### 3.2 Examples on GitHub

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