DESCRIPTION:

A company producing fiber optic sensors decided to implement the concept of Industry 4.0 in one of their production processes. They are going to implement the AI techniques to automate verification of produced sensors. Currently, after the production of the sensor, its characteristics should be verified each time in three reference substances in order to configure:

- Air
- Water
- Isopropanol

After the procedure in the laboratory they collected three spectroscopic signals. Unfortunately, such procedures are extremely time consuming and require large human resources. Therefore they are planning to implement AI algorithms in order to predict characteristics (or any other parameters – you can propose something) of a working sensor in water and isopropanol based on measured characteristics in air. It will enable to reduce validation process only to measurements in the air, but other characteristics will be collected based on the proposed model.

Dataset of manufactured sensors are collected in the google drive: https://drive.google.com/drive/folders/1ha7P4Mwp6_XYnUHs20460CbBC4zwNvf9?usp=share_link

It's a collection of measurements based on 10 sensors . Each sensor was measured three times that you can find in three separated files (e.g. sensor01_air.txt, sensor01_water.txt, sensor01_izopropanol.txt). Each file contains two-dimensional signal (signal wavelength, signal amplitude) as you can observe in figure 1.

Figure 1. Example characteristics of one sensor (measured in air, water and isopropanol).

Based on this characteristics you can use any data mining and machine learning techniques. Of course you can use any mechanisms e.g. data enrichment, feature extraction, signal analysis, etc. The ultimate goal of this task is facing the real problem and design and plan AI implementation plan as follows:

1. Prepare a demonstration of your concept of this project in order to convince the client of your idea (you can use any tools).
2. Implement your solution using the Google Colab tool.
3. Prepare publication of your preliminary results.
4. Share all materials from points 1, 2 and 3 in your personal GitHub or GitLab account and send us the link.