AI TEAM
TRAINING'26

TASK 1

Phase II

Task 1 Phase 2: Solve The Mystery

The famous detective Sherlock Holmes had been working for weeks on a case to uncover a secret society in London, suspected of being behind many mysterious events in recent times. He was close to cracking the case when he discovered that the final clue lay in a hidden room beneath the London sewers. But when Holmes entered the door to the room, things were not as he expected. Instead of finding the secret society, he found himself stepping into a time-travel portal. Suddenly Holmes was transported into the future in Egypt during the digital era. The world around him had completely changed. Letters and telegrams were gone, replaced by digital communications, surveillance systems, and artificial intelligence. Luckily, Holmes found you, the one who offered his help not only that but you are equipped with modern tools and the understanding of AI Together, you will help him solve the mystery

Task 1.1 Uncover the secret hidden word

In this new world, people no longer communicate only by letters, but through audio phone calls and digital recordings. As the case unfolds, Holmes receives an audio message containing a crucial word. Unfortunately, the message has been tampered with by adding a loud buzz noise to mask the evidence. Holmes, unfamiliar with modern signal processing, turns to you for help. Your mission is to recover the hidden word by designing a system that can filter out noise using your understanding of filtering techniques.

Your Objective:

Figure out what the secret word in this audio signals

Technical Requirements:

- Provide a clean code for the complete solution, whether it is a Python script file (.py) or a Notebook.
- The script should play the cleaned audio in the end where the word must be clear to hear.
- Provide a simple documentation of your approach with a simple explanation of the tool you used (use your own words)

Task 1.2: uncover the secret pattern

It turns out the message was a password to open a vault containing a crucial document. The document reveals that the secret society communicates using a pattern of red and blue balls placed in specific orientations in public spaces. Each arrangement of these balls encodes hidden instructions Holmes now needs your help again. This time, you must build a computer vision system capable of detecting these balls in real-world surveillance images so he could deploy it across all the surveillance cameras across the city.
Your system must detect all red and blue balls across different scenes.
Handle challenges such as different lighting conditions and shadows.
Be accurate and reliable, since missing even a few balls may prevent decoding the secret pattern.

Your Objective:
You are given 20 images containing red and blue balls to build and test your system.
Submit the label in the following way:

- Folder with a .txt file where each .txt file corresponds to an image (ensure it follows the same name as the image but different extension, of course)
- Where each .txt file should follow on of the following formats:
  <class_id> <x_center> <y_center> <width> <height>
  For example for the first image with two balls
  0 0.45 0.32 0.12 0.20
  1 0.72 0.55 0.18 0.25

<class_id> <x_center> <y_center> <radius>
For example
0 152 200 25
1 345 180 24

Where the <class_id> corresponds to whether blue: 0 or red: 1

Your system will be evaluated using accuracy, defined as:

$$\text{Accuracy} = \frac{TP}{TP + FP + FN}$$

Where:
TP = True Positives (correctly detected balls)
FP = False Positives (non-balls detected as balls)
FN = False Negatives (missed balls)

Technical Requirements:

- **Implement a classical algorithm using OpenCV (no Deep learning solution)**
- Participants should submit their code in a Python file (.py) and a zip file containing the labeled images folder.
- Please ensure that your code is well-structured and well-documented.
- Provide a simple documentation of your approach with a simple explanation of the techniques you used (use your own words)