MINISTRY OF EDUCATION
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY
COLLEGE OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY
PRACTICAL CO-OP TRAINING

وزارة التعليم
جامعة الإمام عبدالرحمن بن فيصل
كلية علوم الحاسب وتقنية المعلومات
برنامج التدريب التعاوني

جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

PROGRESS REPORT – WEEKS 1-2 (PCT 104)

Student Information

Student Name	**Zainab Abdullah Alsafwani**	**ID Number**	**2200003658**
Company Name	**Worley**		
Submission Date	**20/7/2024**	**Marks Obtained**	

Progress Report Information: Brief description of activities, assignments, projects and type of training you were involved during each week of training, and problems faced with the resources used (Individuals, Books, and websites).

Tasks Done (9 marks)

- Attended the following workshops presented by the TM&D Team from the Corporate General Administration department:
  - Microsoft Teams (1 hour)
  - Microsoft Outlook 1 & 2 (3 hours per day)
  - Microsoft Excel Essentials 1&2 (3 hours per day)
- Integration of an LLM with the YOLOv7 model to generate more human-like feedback on uploaded images. In this system, the YOLOv7 model handles the detection part, identifying and labeling objects in the image, such as safety equipment (e.g., gloves, boots, helmet, vest, goggles, and mask). The LLM is responsible for generating the feedback, providing a detailed and human-like explanation. For instance, after detecting safety equipment on a person in a construction site image, the feedback confirms that the individual is appropriately equipped, taking necessary precautions to protect themselves from various hazards on the construction site.
  - Understanding Large Language Models (LLMs)

        - Gain a clear understanding of large language models, their significance, and their applications. In short, LLMs are AI models trained on extensive datasets to comprehend and produce human-like text.
    - Understand the concept of prompt engineering
        - Understand the concept of prompt engineering, its various types, and its connection to LLMs. Prompt engineering involves refining natural language input prompts for specific tasks to enhance the performance of large language models.
    - Practical Implementation
        - Select Few-Shot Prompting Approach: Choose the few-shot prompting approach to proceed with. Few-shot prompting involves providing the model with several training examples that resemble the desired output.
        - Develop Safety Monitoring Prompts: Create prompts for safety monitoring. The prompts include metadata, which are the detected classes from YOLO, and feedback, which provides examples of the desired model output.
        - Utilizing LLMs: Configure two LLMs to generate responses and content. The models used are TinyLlama from Ollama and Gemini via an API key.
- Develop a user interface for the PPE Detection Platform using Streamlit.
    - Streamlit Interface Development
        - Designed and implemented the main interface for the PPE Detection Platform.
        - Created a visually appealing layout with clear instructions and labels.
        - Added a header with the slogan "SNAP, SCAN, STAY SAFE!" and company's logo.
        - Added an informative sidebar explaining the platform's functionality.
        - Used Streamlit components to ensure the interface is interactive and responsive.
    - Model Selection Feature
        - Implemented a dropdown menu for selecting the LLM (Language Learning Model).
        - Included options for Gemini API and TinyLLAMA (Ollama)
        - Ensured the dropdown is functional, allowing users to choose from available models.
    - Image Upload Feature
        - Developed the image upload section allowing users to drag and drop or browse files.
    - Image Processing and Display
        - Displayed uploaded images with their file names

        - Implemented YOLO-based object detection for PPE items
        - Showed both original and processed images with bounding boxes for detected items
    - Detection and Feedback Display
        - Generated and displayed feedback on PPE compliance based on detected items.
    - AI-Powered Description
        - Utilized selected LLM (Gemini or Ollama) to generate detailed explanations of PPE importance.
- Displayed AI-generated feedback below the processed images

Challenges Faced (3 marks)

- Installing the LLM locally in my device.
- Understanding Streamlit basics and its core functionalities
- Developing a whole interface for the first time was challenging, including seamlessly integrating multiple technologies (Streamlit, YOLO, LLMs) into a cohesive system.
- Figuring out way to integrate yolo output with the LLM.

Resources Used (3 marks)

- Individuals:
    - Company supervisor
- Websites:
    - https://docs.streamlit.io/
    - https://www.techtarget.com/whatis/definition/large-language-model-LLM
    - https://www.prompthub.us/blog/the-few-shot-prompting-guide#what-is-few-shot-prompting?
    - https://learn.microsoft.com/en-us/ai/playbook/technology-guidance/generative-ai/working-with-llms/prompt-engineering
    - https://ollama.com/
    - https://ai.google.dev/gemini-api/docs/quickstart?lang=python
    - https://dev.to/pavanbelagatti/wth-is-prompt-engineering-h03
- Software:
    - Microsoft word
    - Outlook
    - Microsoft teams
    - Vs code
    - Ollama

```
def create_prompt(classes):
    prompt = f"""

You are a safety manager at a construction site responsible for ensuring all
You are to observe and monitor the employees, noting what PPE each employee is wearing and what they are not. .

Metadata received: ['gloves', 'gloves', 'Boots', 'Boots', 'helme', 'vest', 'Googles']
Feedback: The person is wearing gloves, boots, a helmet, a vest, and goggles.
However, they are not wearing a mask, crucial for protecting against dust, particles, and respiratory hazards.


Metadata received: ['gloves', 'gloves', 'vest', 'Googles']
Feedback: The person is wearing gloves, a vest, and goggles. However, they are not wearing boots, a helmet, or a mask,
necessary for foot and head protection, and to prevent inhalation of dust and harmful particles.


Metadata received: {classes}
Feedback: """

    return prompt
```

Figure 1:Few Shots prompting

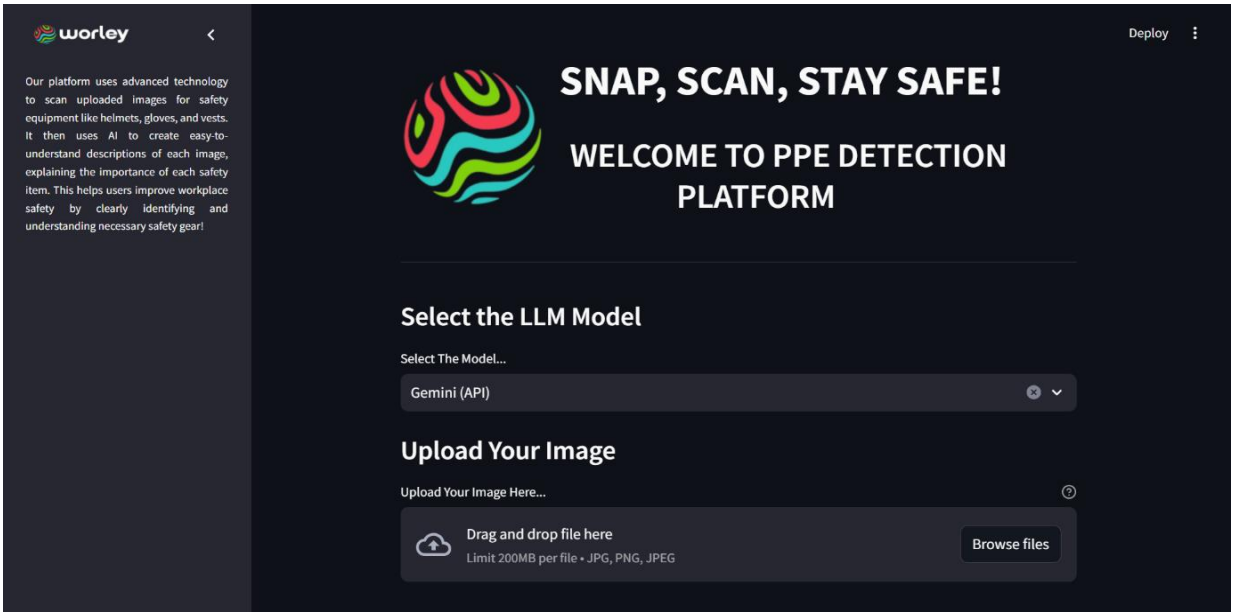

Figure 2: PPE Detection Platform UI

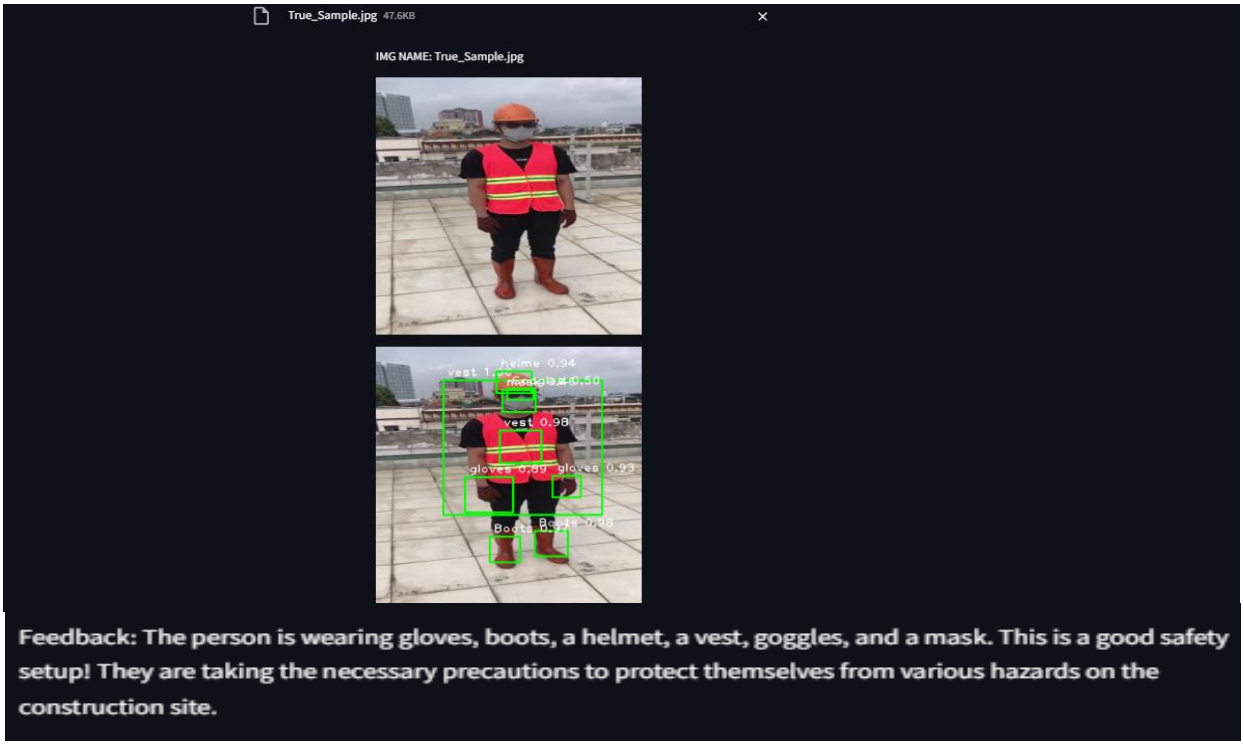

Figure 3:Feedback sample