**Objective**

The primary objective of this assessment was to create a model capable of detecting and identifying individuals wearing nametags within video frames. This involves several key steps, including data preparation, augmentation, model training, and evaluation.

**2. Data Collection:**

* + Started with a small dataset consisting of three images of people wearing nametags. Due to the limited dataset, I created some data using photoshop and data augmentation was necessary to expand the training dataset.

**3. Data Augmentation**

* + Developed a Python script using the Keras ImageDataGenerator for augmenting images. The script generated variations of the original images by applying transformations such as rotation, scaling, flipping, and brightness adjustment.
  + The augmented images were stored in a directory structure compatible with YOLOv5.

**4. Labeling**

* + Used makesense.ai, a graphical image annotation tool, to manually label the bounding boxes around the nametags in the images. Each image was annotated with the class name "nametag".
  + Saved these annotations as .txt files in YOLO format (class\_id, center\_x, center\_y, width, height).
  + Organized the labeled images and annotations into appropriate directories: images/train/, images/val/, labels/train/, and labels/val/.

**5. Model Training with YOLOv5**

* **Implementation:**
  + Configured the training parameters, including the batch size, number of epochs, and learning rate.
  + Ran the training script, pointing it to the directories containing the training images and corresponding labels.
  + Monitored the training process, ensuring that the model was converging and adjusting parameters as necessary.

**6. Validation and Evaluation**

* **Objective:**
  + To assess the model's performance on unseen data and ensure its ability to generalize.
* **Implementation:**
  + Used a separate set of validation images not seen by the model during training.
  + Evaluated the model’s performance using metrics such as Precision, Recall, and mAP (mean Average Precision).
  + Identified areas for improvement, such as refining the model or gathering more diverse training data.

**8. Conclusion**

* Successfully trained a YOLOv5 model to detect and identify people with nametags in images and video frames.
* The approach combined data augmentation, manual labeling, and careful monitoring of the training process to overcome the challenge of a limited dataset.