Project Number 7 – Manual operations

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- Project description: In this project we will collect videos of manual operations, such as screwing, pushing, and measuring. Then train a model to detect these operations, test their accuracy and measure their performance.

- The goal of this project is to develop a model system capable of detecting and measuring the performance of various manual operations, including but not limited to screwing, pushing, and measuring. The system will analyze video data and identify specific manual operations within a given context. Additionally, the system will quantify the performance of these operations based on defined metrics.

- Details of 7 tasks:

1. <u>Data Collection and Annotation:</u> Collect a diverse dataset of videos containing the manual operations we want to detect. Annotate the videos to mark regions of interest and label operation types and performance metrics.

2. <u>Data Preprocessing:</u> Prepare the annotated dataset for training by applying necessary preprocessing techniques such as: Resize videos to a standardized format and implement data augmentation strategies for increased model generalization.

3. <u>Model selection and training:</u> Choose a deep learning model architecture for video analysis and train the selected model on the annotated and preprocessed dataset.

4. <u>Model Testing:</u> Monitor the model's performance and collect additional data for retraining if needed.

5. <u>Deployment:</u> Implement the trained model into a deployable system for real-time manual operations detection and performance measurement.

6. <u>Model Optimization and Evaluation:</u> Assess the trained model's performance, Evaluate and analyze the trained model on a separate test dataset to assess its performance, accuracy in different scenarios.

7. <u>Documentation and Reporting:</u> Document the entire process, including dataset details, model architecture, training parameters, and deployment instructions. This documentation is valuable for future reference and collaboration.

A table of milestones derived from the tasks:

	Task name	Content of Submission	Measure	Date
1.	Data Collection and Annotation	Learning programs that we will use in the project and collecting videos of manual operations.	Review the videos that we have collect and annotated dataset for completeness and accuracy.	28.01.2024
2.	Data Preprocessing	Preprocessed dataset ready for model training	Resize videos to a standardized format. Implement data augmentation strategies for increased model generalization.	04.02.2024
3.	Model selection and training	Submit a model that was trained to detect manual operations.	Measure the validation of the videos that we collected with the operations.	11.02.2024
4.	Model Testing	Monitor the model's performance.	Testing the model and collect additional data for retraining if needed.	18.02.2024
5.	Deployment	Deployable system for real-time detection and measurement	Successful testing in various real-world scenarios	25.02.2024
6.	Model Optimization and Evaluation	Evaluation report detailing model performance and detect the errors to Optimize the model.	Measure the model performance by Remove the features that make the error.	03.03.2024
7.	Documentation and Reporting	Comprehensive project documentation and report	Approval of documentation completeness and clarity	10.03.2024