**Automatically Segment and Label Objects in Video using AI in MATLAB**

The purpose of "Automatically Segment and Label Objects in Video using AI in MATLAB" is to automate object recognition and labeling in video frames using deep learning and MATLAB. The dataset is prepared using publicly accessible datasets or videos, with pixel-by-pixel annotations created using MATLAB's Video Labeler application. Images and label masks are stored in separate folders, with each object category assigned a class name and unique pixel label ID for training.Due to its suitability for semantic segmentation, a deep learning model with a ResNet-18 backbone, such as DeepLabv3+, is chosen for segmentation tasks. MATLAB's deeplabv3plusLayers is used to create the network, and the train Network function is used to train it with customized training parameters, such as the Adam optimizer, number of epochs, mini-batch size, and learning rate. Following training, the network is stored and incorporated into a unique automation algorithm. A custom MATLAB class that extends vision labeler. The Automation Algorithm is used to construct this algorithm. This class includes methods for loading the trained model and applying the semantic function to every video frame. As a result, objects are automatically highlighted and categorized by segmentation masks. Alternatively, a YOLOv, YOLOv8 with transfer learning object detector can be used if object detection is more important than segmentation. This entails using image datastore and boxLabel Datastore to read image paths and bounding box data from a CSV file, then combining them for training. The YOLOv4, YoLOV8 and transfer learning model is trained with trainYOLOv4 ObjectDetector and a predefined layer structure. After training, the model is capable of detecting and classifying multiple objects in each frame of a video. As a result, objects are automatically highlighted and categorized by segmentation masks. Alternatively, a YOLOv4 object detector can be used if object detection is more important than segmentation. This entails using image datastore and boxLabel Datastore to read image paths and bounding box data from a CSV file, then combining them for training. The system uses computer vision algorithms to enhance segmentation accuracy by extracting features. Post-processing techniques refine segmentation masks for precise boundaries.. A robust model, such as DeepLabv3+ / YOLOv4, is chosen and trained, the training data is meticulously prepared, and a custom automation algorithm is used for deployment. With consistent and accurate labeling results and a significant reduction in manual labeling time, the resulting system is beneficial for various applications in computer vision research, smart transportation,(lane/vehicle segmentation), and surveillance. The project addressed challenges like labeling, class imbalance, and real-time processing limits, and GPU optimization. In future include to the next model of YOLOv9 and adopting active learning.