Requirements for Non-AI and AI Techniques for Counting Items and Overlaying Masks

Non-AI Approach Requirements:

* Google Collab Setup
* Ensure that you have a Google account to access Google Collab.
* Google Drive should be organized with datasets correctly placed in the drive paths.

Libraries and Dependencies

* OpenCV: An open-source computer vision and machine learning software library.
* Install using! pip install OpenCV-python-headless.
* NumPy: A library for the Python programming language, adding support for large, multi-dimensional arrays and matrices.
* Install using! pip install numpy.
* Matplotlib: A plotting library for the Python programming language and its numerical mathematics extension NumPy.
* Install using! pip install matplotlib.

Dataset Preparation

* Ensure the datasets are uploaded to Google Drive and accessible via the given paths.
* Images should be in common formats like .jpg or .png.
* Google Drive Mounting
* Mount Google Drive to Collab to access the datasets using drive. Mount('/content/drive').

Code Execution Steps

* Import necessary libraries (OpenCV, NumPy, Matplotlib).
* Define paths to datasets.
* Implement image processing functions:
* Load and preprocess the images (grayscale conversion, blurring, edge detection).
* Find contours and count the number of items.
* Draw contours on images and display them.
* Iterate over images in the datasets and process each image.

AI Approach Requirements

Google Collab Setup

* Ensure you have a Google account to access Google Collab.
* Organize Google Drive with datasets correctly placed in the drive paths.

Libraries and Dependencies

* PyTorch: An open-source machine learning library based on the Torch library, used for applications such as computer vision and natural language processing.
* Install using! pip install torch torch vision.
* Pillow: Python Imaging Library (PIL) adds image processing capabilities to your Python interpreter.
* Install using! pip install pillow.

Dataset Preparation

* Ensure the datasets are uploaded to Google Drive and accessible via the given paths.
* Images should be in common formats like .jpg or .png.

Google Drive Mounting

* Mount Google Drive to Collab to access the datasets using drive. Mount('/content/drive').
* Code Execution Steps
* Import necessary libraries (PyTorch, torchvision, Pillow, OpenCV, Matplotlib).
* Load a pre-trained object detection model (e.g., Faster R-CNN) from PyTorch's torchvision module.

Define paths to datasets.

* Implement image processing functions:
* Load and preprocess the images using transforms from torchvision.
* Perform object detection using the pre-trained model.
* Filter predictions based on confidence score thresholds.
* Draw bounding boxes and display them.
* Iterate over images in the datasets and process each image.

Detailed Instructions for Using Google Collab

Step-by-Step Instructions:

1. Setting Up Google Collab:

* Open Google Collab by visiting Google Collab.
* Sign in with your Google account.
* Create a new notebook.

2. Mounting Google Drive:

* In your Collab notebook, mount your Google Drive to access the datasets:

from google.colab import drive

drive.mount('/content/drive')

* Follow the prompt to authorize and mount the drive.

3. Installing Required Libraries:

* Install necessary libraries for both Non-AI and AI approaches. You can run the following commands in separate cells:

! pip install opencv-python-headless

! pip install numpy

! pip install matplotlib

! pip install torch torchvision

!pip install pillow

4. Preparing Datasets:

* Ensure your datasets are organized and uploaded to Google Drive. The paths should be similar to:
* ‘/content/drive/MyDrive/ScrewAndBolt\_20240713’
* ‘/content/drive/MyDrive/ScrewAndBolt\_20240713/Screws\_2024\_07\_15’

5. Implementing Non-AI Approach:

* Write the code to process images using OpenCV:
* Load the image.
* Convert to grayscale, blur, and detect edges.
* Find contours and draw them.
* Display the number of items and the processed image.
* Process each image in the datasets by iterating over the files.

6. Implementing AI Approach:

* Write the code to process images using a pre-trained object detection model:
* Load the image and convert it to a tensor.
* Perform object detection using the model.
* Filter predictions based on confidence scores.
* Draw bounding boxes around detected objects.
* Display the number of items and the processed image.
* Process each image in the datasets by iterating over the files.

7. Running the Code:

* Execute each cell in your Collab notebook step-by-step.
* Ensure that each step completes without errors.
* Check the outputs to verify the results.

Conclusion

Following the above steps will enable you to count items and overlay masks on the images from your datasets using both Non-AI and AI techniques. The non-AI approach leverages OpenCV for image processing, while the AI approach utilizes a pre-trained Faster R-CNN model for object detection. Ensure that all dependencies are installed and datasets are correctly placed in your Google Drive for seamless execution.