Hands-on Exercise | Multilabel Annotation Using CVAT

Learning Objectives

- Understand and apply multi-attribute annotation techniques for glass waste images
- Gain practical experience using CVAT for complex annotation tasks
- Develop skills in identifying and labeling various glass characteristics
- Learn to provide contextual information through annotation comments
- Practice quality control and consistency in data annotation

Estimated Time to Complete

This exercise should take approximately 60-90 minutes to complete.

Scenario

You are part of a team working on improving waste management and recycling processes for a large manufacturing plant. The plant produces various glass products and needs to optimize its recycling efforts. Your task is to annotate images of glass waste to help train an AI model that will automate the sorting process, enhancing recycling efficiency and reducing environmental impact.

Objective

To perform multi-attribute annotation on a set of glass images, identifying color, condition, material presence, and size using CVAT.

Materials Needed

- Set of images (provided in the course materials)
- Access to CVAT platform and CVAT account credentials

Tips for Accurate Annotation

- Take your time to examine each image carefully before annotating
- Use the zoom feature (often controlled by the mouse wheel or +/- buttons) for detailed inspection of small features or text on the glass
- Be consistent in your labeling across similar images to ensure data quality
- If you're unsure about an attribute, use the comment feature to note your uncertainty for later review

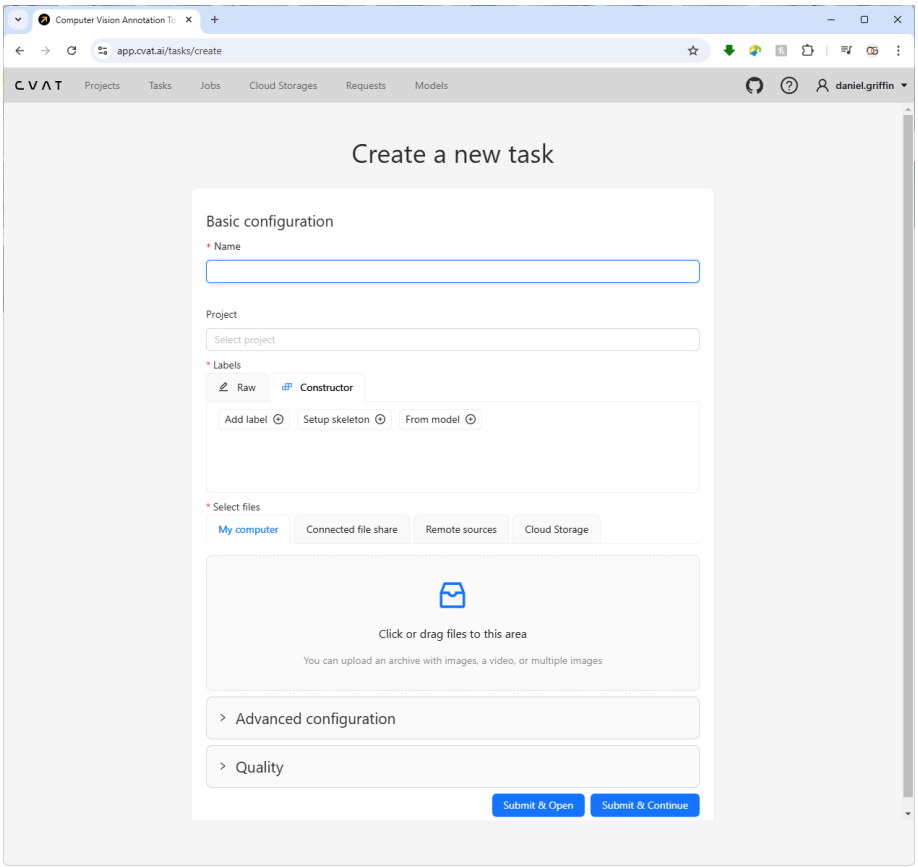
Detailed Steps

Access CVAT

1. Open Google Chrome (Google Chrome is the only web browser that fully supports CVAT and all its features. Please ensure you use Google Chrome for this exercise.)
2. Navigate to the CVAT platform by entering the URL: https://cvat.ai
3. On the CVAT homepage, click the **Try for free** button in the top right corner or click the **Start using CVAT** button on the page.
4. Enter your CVAT account credentials (username and password) that were created previously
5. If you don't have an account or need to create a new one, refer to the "CVAT Account Setup Guide" found in the Resources tab at the bottom of this eLearning page.

Create a New Task

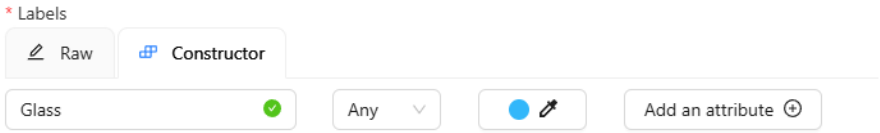
1. After logging in, click on **Tasks** in the main menu at the top of the page
2. Look for and click the **+ Create New Task** button, usually located in the top right corner.



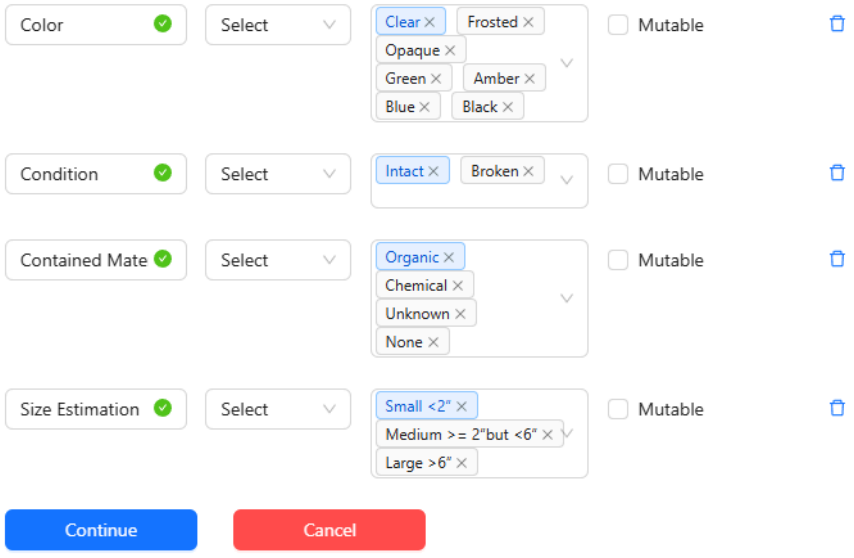
3. In the "Create a new task" form, enter the name **Waste Annotation**.

Set Up Labels

1. Within your newly created project, find the “Labels” section.
2. Click the **Add Label +** button
3. Label name: **Glass**
   - Any (tool limitation drop down).
   - Pick a color if you like (Change the color of the label dropdown).

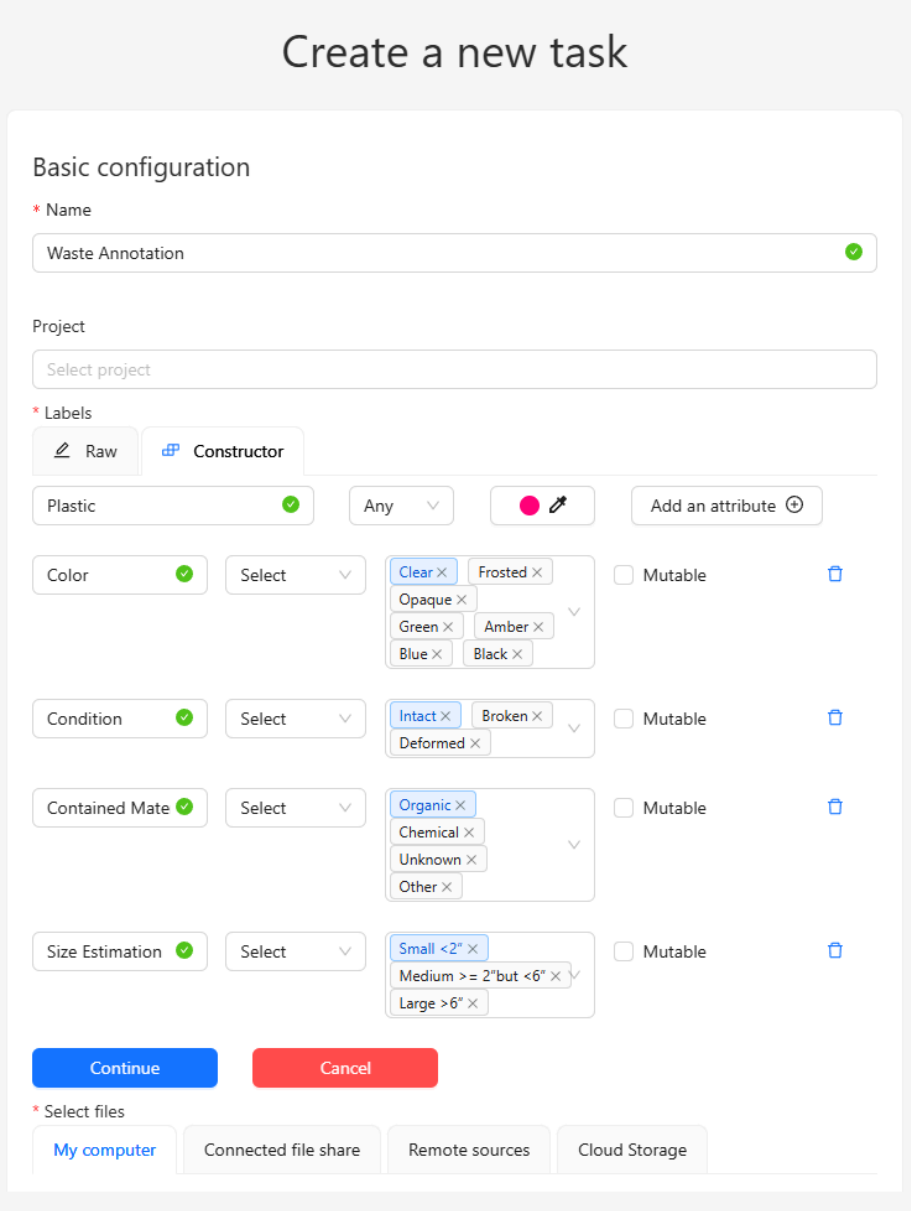


4. Click on **Add an attribute +** 4 times and add the following:
   - Attribute Name: **Color**
     - Attribute values: Clear, Frosted, Opaque, Green, Amber, Blue, Black
   - Attribute Name: **Condition**
     - Attribute values: Intact, Broken, Deformed (Plastic Only)
   - Attribute Name: **Contained Material**
     - Attribute values: Organic, Chemical, Unknown, None
   - Attribute Name: **Size Estimation**
     - Attribute values: Small <2”, Medium >= 2”but <6”, Large >6”



5. Click **Continue** to add the Glass label and all its attributes.
6. Create another label named: **Plastic**
   - Use the same attributes as you did with the plastic label you just created.

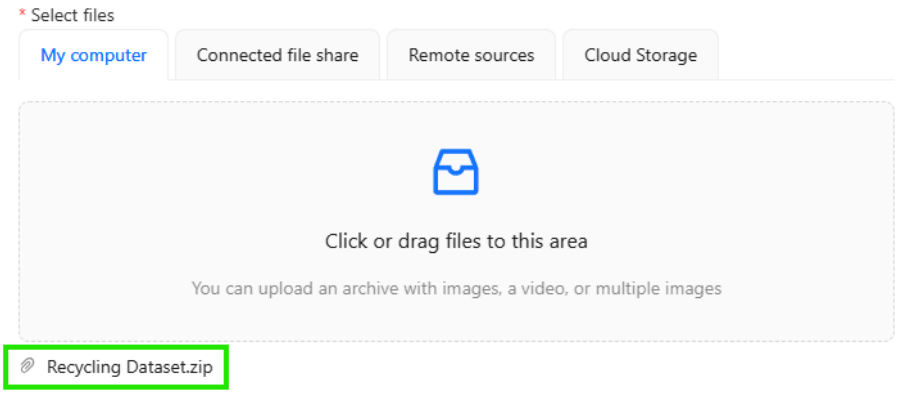
- If you remember how to and feel comfortable doing so, you can copy and paste in the raw editor. This is something we did in a previous exercise. If you cannot remember just use the guided tool to build the label and attributes as you did in the previous step.



7. Click **Continue** to add the Plastic label and all its attributes.

Upload Images

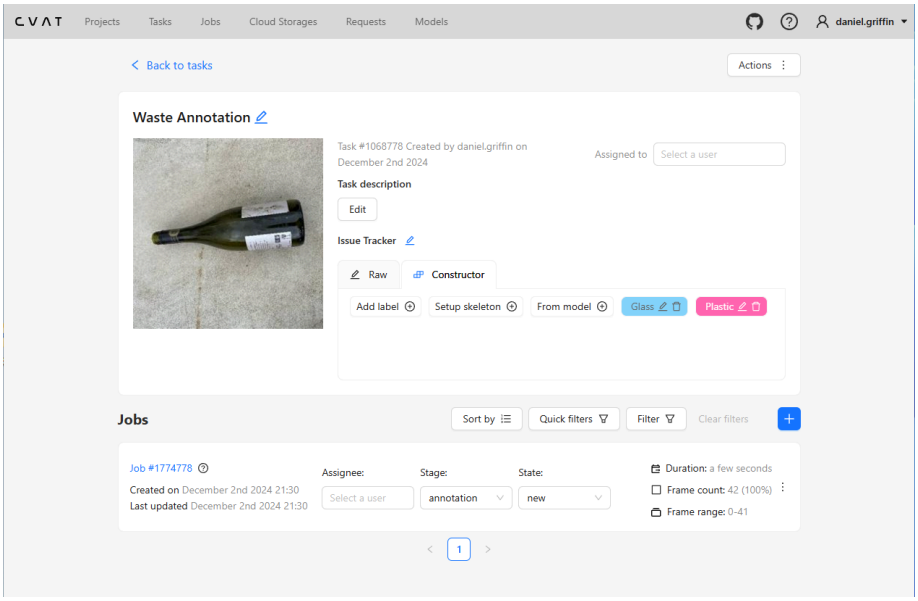
1. In your task setup screen, locate the "Select files" section.
2. Make sure that the **My Computer** tab is active
   - **Note**: If you have not already downloaded the **Recycling Dataset.zip** from the Resources tab at the bottom of this eLearning page, you'll need to do so before moving onto the next step. You do not need to unzip this file.
3. Click **Click or drag files to this area** to browse your computer for the zip file.
4. Navigate to the location you saved the file when it was downloaded (if in doubt, check your downloads folder).
5. Select the **Recycling Dataset.zip** file and click **Open** to upload it
6. Wait for the upload to complete, you will be able to tell if it's complete by whether there is a paperclip icon and the file name at the bottom of the Select files section.



7. Once uploaded, click **Submit & Open** to create and open the task
   - **Note**: This can take a minute to process.
   - After this step has finished you should be looking at the Task Details for the Waste Annotation task. There should also be a job created below the task details.

Start Annotation

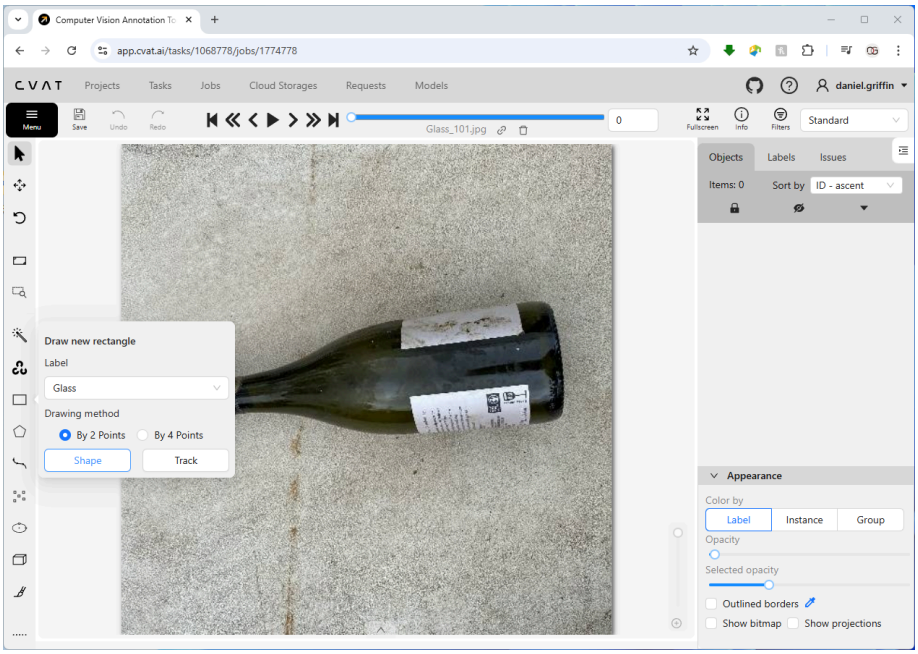
1. In the Jobs section, review the details then click the **Job #** to start annotating.



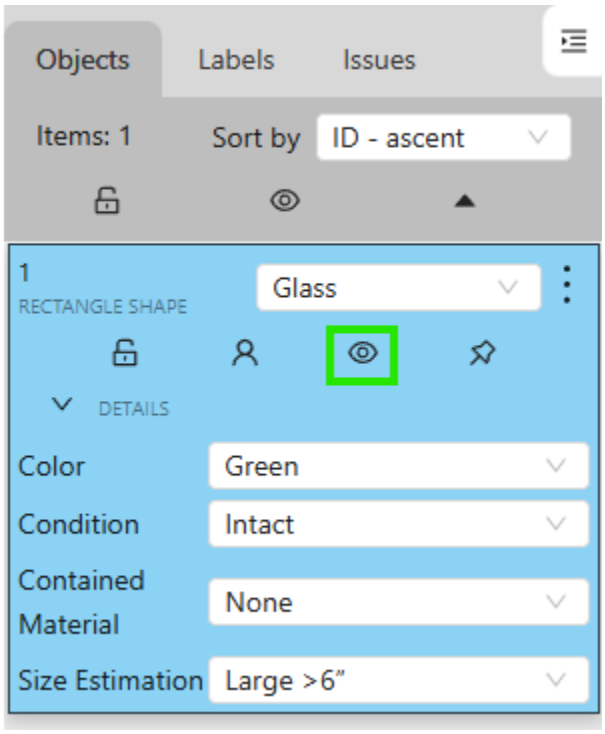
Annotate Each Image

For each image in the set:

1. Select the appropriate shape tool from the left sidebar (usually the rectangle tool for object detection); Select the rectangle tool, choose the correct label, use the 2-point drawing method, click **Shape** to begin.



2. Draw a bounding box around the object by clicking to start, dragging, and clicking to finish.
3. In the label menu that appears in the **Objects Panel** (on the right side of the screen):
    a. Click to expand **DETAILS**
    b. Choose one option from each category: Color, Condition, Material, and Size
    c. If you cannot see the aspects of the object because the bounding box is obscuring it, click the **EYE** icon to hide it temporally.



4. If you make a mistake, use the "Undo" button, modify the annotation, or worst case delete the annotation and start over.

Review and Adjust

1. After annotating an image, take a moment to review your work
2. Check that the Label and all required attributes (Color, Condition, Contained Material, Size) are correct.
3. Ensure the bounding box accurately encompasses the object
4. Make any necessary adjustments by clicking on the annotation and editing its properties or position

Move to Next Image

1. After creating an annotation, press **F** (move to next shortcut) and then press **N** (use last tool shortcut) or click the respective button on the screen.
2. Alternatively, you could use the navigation arrows (usually located at the top of the workspace) to move to the next image.
3. Repeat the annotation process for the rest of the images.

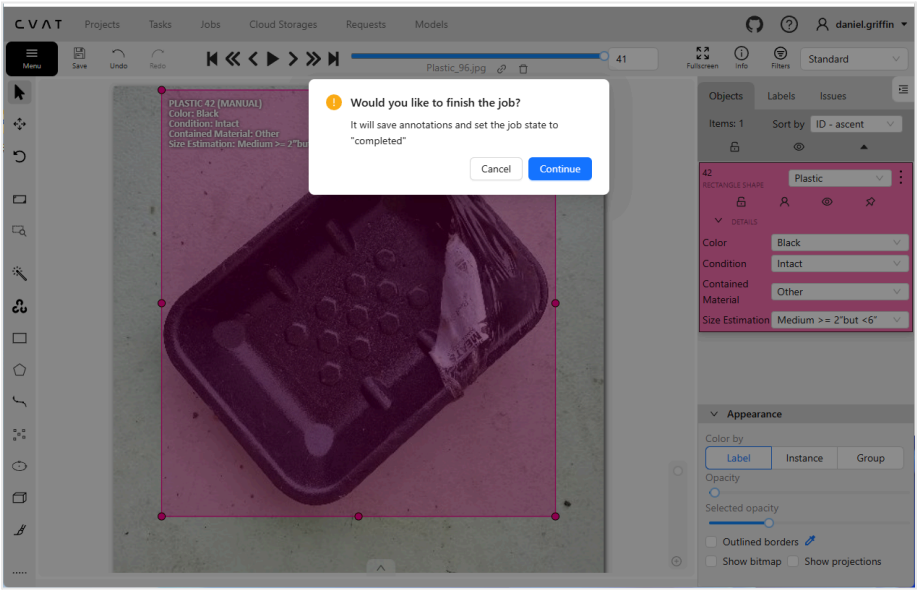
Note: Throughout the annotation process, use the "Save" button (located in the top left corner) frequently to preserve your work.

Quality Check

1. After completing all images, perform a final review of your annotations.
2. Use the image navigation tools to quickly scan through all annotated images.
3. Pay special attention to consistency across similar images.
4. Check that all required attributes are selected for each annotation.
5. If you notice any errors or inconsistencies, make the necessary corrections.

Save and Submit

1. After reviewing and finalizing all annotations, click the **Save** button.
2. Next, click **Menu**, then click **Finish the Job**.
3. You may be prompted to confirm your submission, click **Continue**.
4. After submission, your annotations will be saved and the task will be marked as complete.



5. You can now safely navigate away from the annotation screen by clicking back onto the **Tasks** tab.

6. Find the Waste Annotation task and click **Open**.
7. View the Job State is now **Complete**.

Reflection

After completing the exercise, consider the following questions:

1. What challenges did you face during the annotation process?
2. How might these detailed annotations improve AI model performance in waste management and recycling?
3. What additional features in CVAT could help improve the annotation process for this specific task?
4. It should be obvious now why annotation guidelines and quality metrics are so important.

Troubleshooting

- If images don't load, try refreshing the page
- If you can't create a new label, ensure you've clicked 'Save' after each label creation
- If the annotation tools are not responding, try logging out and logging back in
- If you encounter persistent issues, check your internet connection and try using a different browser

Note: If you encounter any technical issues while using CVAT, please carefully review the instructions and try to troubleshoot on your own. This exercise is designed for self-guided learning.