# ADaRT

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# Introduction

## What is ADaRT?

ADaRT is a data reviewing tool that can help you find errors in annotation as well as generate visual analytics of the errors. This tool will provide an easy way to parse the dataset (and the labels), and label and classify the errors.

This tool also has provision for visual representation of both dataset statistics as well as the error/label statistics and create downloadable reports. These reports can then be sent back to the annotators who can use them to improve the quality of the annotations.

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Figure 1: Dashboard

# Users

ADaRT is a tool that is useful for users of computer vision annotated data. This includes annotators, reviewers, and Project Managers.

### Step 1: Create User

The Admin can create new users by going to the **Users** page and clicking **Create** **User.** The admin will need to put in an email (or username), create a password and optionally enter the Full Name and Description of the new user. The Admin also has the option of making this new user “active” or “inactive”. Selecting the Group of the User sets the Level of accessibility that they can have. (Only Email is mandatory)

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Figure 2: Create Users

## User Levels

1. **Admin**
2. **Reviewers**
3. **User**
4. **Admin Privileges:**

* Full privileges.
* Can create reviewers and labelers.
* Can assign projects to reviewers.
* Can assign tasks to reviewers.
* Can assign tasks to users.
* Can view all controls and metrics. Can see all the stats at each level of the projects.

**Admin Workflow**:

* Create project.
* Create Tasks.
* Assign tasks to labelers.
* Assign tasks/project to reviewers.
* Monitor progress of tasks.
* Communicate with reviewers about project details. (not within tool)
* Reply to reviewers and labelers’ questions, comments, and concerns.

1. **Reviewer Privileges**

* Cannot create projects or tasks.
* Can only see tasks assigned to them.
* Can only see metrics in image viewer and progress through a task.
* Cannot see overall metrics.
* Can chat with reviewers and admin where needed.

**Reviewer Workflow**

* Gets notification of being assigned to a task.
* Does task
* Reports to admin and reviewer about task completion.
* Can send requests for help if needed.

1. **User Privileges**

* Can see Home, Dashboard, and Reports
* Only a viewer
* No reviewing privileges.
* Can be used as accounts to share with management or people who want to just see the project statuses.

# Installation

Download the latest ADaRT version and follow the Readme file.

OR

Connect to the server version.

# Execution

**Local version:** Once installed, the local version runs independent of the internet or a server connection. The local user can upload any number of projects and datasets to be analyzed. The metrics, once analyzed, can be locally downloaded, and then distributed as needed.

This version is most useful for those users who have large datasets that need a quick sampling and review of errors in annotation.

This version is compatible with the server version of the tool and the data can be exported to the server once the user has made an account. (under construction)

**Server version:**

You can sign up for a manager account or an account can be assigned to you as a reviewer.

Depending on whether you are a manager or reviewer you will have different levels of availability of the tool’s features.

**Login: NOTE**

You need to click the login button twice to activate the login function. “Enter” button will not work.

# Workflow

**A picture containing timeline

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Figure 3: Basic Workflow  
\*under construction

## Basic Workflow

1. **Create User (Refer to User section)**
2. **Create Project**
3. **Create Task**
4. **Assign Task**
5. **Perform Task/ Review**
6. **Verify Reports**

### Dashboard:

The Dashboard shows the available Projects and Tasks and the basic statistics for each.

* For the **Projects**, the following information is available:

ID, Name, Image Count, Label Count, Error Count, Task Count, Task Done count and Percentage of total Project completed.

* For the **Tasks**, the following information is available:

Project ID, Task ID, Name, Image Count, Label Count, Error Count, Annotated by, Reviewed by and Status.

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The status of the Tasks is set by the Admin or the Superuser.

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## Project

This step allows you to create a new project on the tool. Navigating to the sidebar, an admin will see three options: Create Project, Update Project, and Delete Project

### Step 2: Create Project:

When an Admin navigates to this option, they are presented with the option of choosing the type of project they want to create. Currently only the “Data” type is available.

In the main window, you can create a new project by creating a Project name and entering an optional Description. Click the Create Project button to complete the creation.

This Project will have a unique ID. Multiple Tasks can be assigned to this project and tasks within the same project can be assigned to multiple workers.

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Figure 6: Add Project

#### Update Project

If an admin wants to update the name or the description of a project, you can navigate to the Update Project option and simply change the project details as desired.

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Figure 7: Update Project

#### Delete Project

To delete a project, an admin can navigate to the Project option in the sidebar and select ‘Delete Project. This will let the Admin choose a project to delete. A confirmation message will appear in the sidebar once a project has been selected. Click on that message to confirm the deletion of the chosen project.

If you wish to delete a particular task, that can be done from the Task option in the sidebar.

## Tasks

The Task function can only be accessed by the Admin or the SuperAdmin

**Options:** Navigating to the Task option in the sidebar presents you with 4 options: Add Tasks, Assign Tasks, Change Status or Delete Task

### Step 3: Add Task

Select a Project from the dropdown menu to add a Task to that Project.

Enter the Task Name and select the format of the annotations from the dropdown menu.

To upload the data, you can use one of the following means (Folder structure is not important or mandatory)

1. Drag and drop the folder. (Recommended because you can upload entire folders at once)
2. Browse computer for the folder.

**Note:** You can drag and drop folders without having to restructure the folders within. The folders can contain both images as well as the label files. The program will appropriately upload the image and label files in the appropriate folders.

A screenshot of a project

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Figure 8: Add Task

### Step 4: Assign Task

First select the desired project from the dropdown menu in the sidebar. You will see the tasks in that project in the main window. Choose the task(s) you want and assign it to the desired user from the dropdown menu. Click the Assign Tasks button to complete the selection. This Reviewer will now be able to access the assigned tasks and perform the Task Review.

Even if a task is assigned to a user who falls within the User category, they will not be able to perform the Task Review.

Reviewers can only see and perform the tasks that are explicitly assigned to them.

#### Change Status

The Status of a task can be changed in two ways and is immediately reflected in the Dashboard.

1. When a task is assigned to a reviewer, the status of the task is changed to “Working.”
2. An Admin can navigate to the Change Status option in the sidebar under Tasks and manually change the status of one of multiple tasks under a Project to the desired state among the following: New (Default), Working, Done, and Closed.

#### Delete Task

To delete a task, an admin can navigate to the Task option in the sidebar and select ‘Delete Task’. This will let the Admin choose a project and individual tasks to delete. A confirmation message will appear in the sidebar once a task has been selected. Click on that message to confirm the deletion of the chosen task.

If you wish to delete an entire project, that can be done from the Project option in the sidebar.

## Reviews

Only Admins and Reviewers will have access to the Review functionality. While Admins can review all the tasks, Reviewers can only view and review the tasks that are assigned to them. Navigating to the Reviews option in the sidebar will present you with three options: Review Images, Review Task and Auto Review.

#### Review Images

To review all the images in any project, both admins and reviewers can navigate to the Review Images option and select a project from the dropdown menu. In the main window you will see thumbnails of all the images contained within the selected project along with their names. You can click on the name of the image to enlarge the thumbnail. To view the image in its original size, click on the set of arrows to the top right side of the image.

Note: Images from all subtasks are displayed together with no distinction of the tasks.

### Step 5: Review Tasks

To review a task, select the desired project and sub task from the sidebar. The User Class of reviewers will only be able to see the tasks that have been assigned to them.

Once you have selected the project and the task, the images will load in the main window one by one. You can navigate to a particular image from the dropdown menu. This menu will also show you the name and the number of the current image under review. You can use the arrows on either side of the dropdown menu to navigate to the next or previous images.

Once an image is loaded, you are presented with two sets of information and options. To the right of the image, you can see all the annotations that the image currently contains sorted by class. You can expand a class to see individual annotations and select one or all to see them on the image itself.

At the bottom of the image, you will see 4 options and a slide bar that allows you to change the opacity of the label itself. The four buttons are: Untagged, Delete, Reset and Clear all.

The Reset and Clear all buttons will show or hide the annotations as needed with one click instead of individually selecting all annotations.

The Delete Button deletes an annotation.

When you click the Untagged button, a red box will appear on the image. Use the mouse/trackpad to maneuver this box to any area in the image that needs to be tagged but wasn’t tagged. Click on the box to activate the Error Classification. This Error appears to the right of the image under the annotations. Select the desired error category from the dropdown menu and enter in a comment in the comment box.

Click Set Error to record the error.

A screenshot of a computer screen

Description automatically generated with low confidence

If there is an error in another annotation, click the annotation on the image to activate the Error Classification. When you click on any annotation, all available attributes also appear above the Error Classification details. Check all the different attributes of any annotation and then select an error (and comment) as above where necessary. Click Set Error to record the error.

Once all the Errors in an image have been identified and set, click Save (located to the right of the Next Image Navigation Arrow). If you come back to an image where an error has been set and saved, that annotation will now appear as Red.

#### Auto Review

This function allows the Admin and the Reviewer to gain information about the Tasks in the form of cluster analysis. After selecting a project from the drop-down menu in the sidebar, you can select either Cluster Images or (or together with) Cluster Labels (Overlaps and Tiny Objects are currently unavailable) and click Auto-Review in the main window to initialize the clustering review.

The results of this review are shown in the form of scatter plots. These plots are fully interactable.

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Description automatically generated with medium confidence

From left to right, the plot interaction labels are Download plot as a png, Zoom, Pan, Box Select, Lasso Select, Zoom In, Zoom Out, Auto-scale axes, Home and the final button takes you to the home page of the Python library of Plotly which has been used to generate these plots.

**Note: All ADaRT plots have identical interaction functions.**

### Step 6: Reports

To access all the reports, navigate to the Reports option in the sidebar. Reports are accessible by all classes of users. You can view three sets of reports: File Metrics, Image Metrics and Label Metrics.

Each of the three sets of charts are available for download via the Download Charts button on each page in the main window (as a PDF, individual CSV files or a combined Excel file). For Label Metrics, you can view the data in tabular format for some of the charts if desired.

**Note:** For the combined PDF of the plots, right now you can only download them in black and white. For color image downloads, you can download each chart individually using the camera icon on the top right of the chart.

At the bottom of the page for Label Metrics, you can also download all the statistical information about the dataset and its labels as either an Excel sheet or a CSV file. This file contains the distribution of the labels and the errors per image.

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#### File Metrics

Histogram plots depicting the file creation and the file size distribution.

#### Image Metrics

Histogram plots depicting the aspect ratio of the images and the brightness of the images.

#### Label Metrics

Histograms depicting the distribution of error counts by class of errors, the distribution of class count for the labels and the distribution of the overlap areas for the labels.

A scatter plot showing the distribution of the label dimensions sorted by the class of the labels.

# Warnings:

1. If you want to save your password in the browser, make sure that you check what you are saving. The tool will encode the passwords, so in case you save it without checking, the password might be gibberish instead of your desired password.