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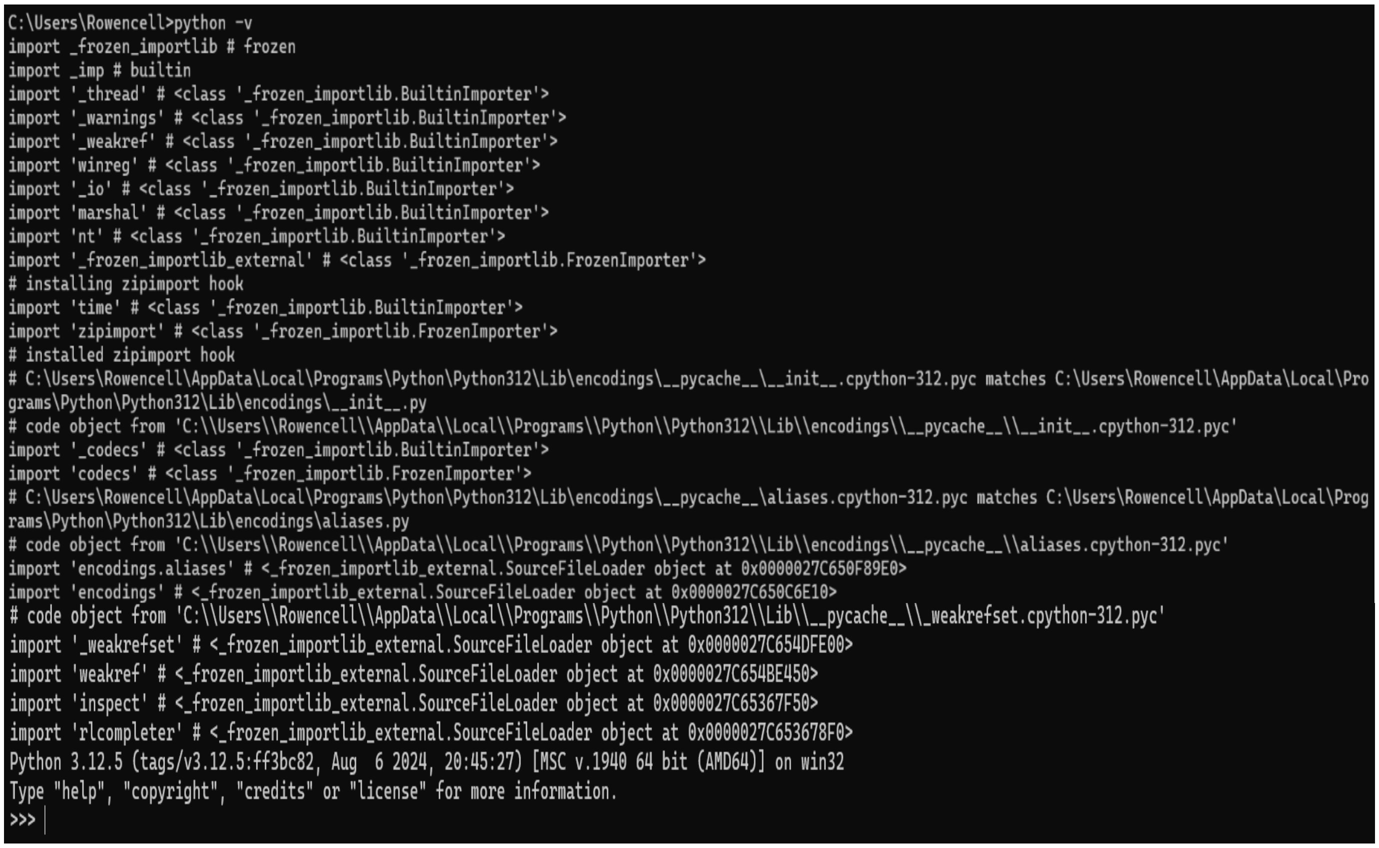
DS 3/FOPI01

February 19, 2024

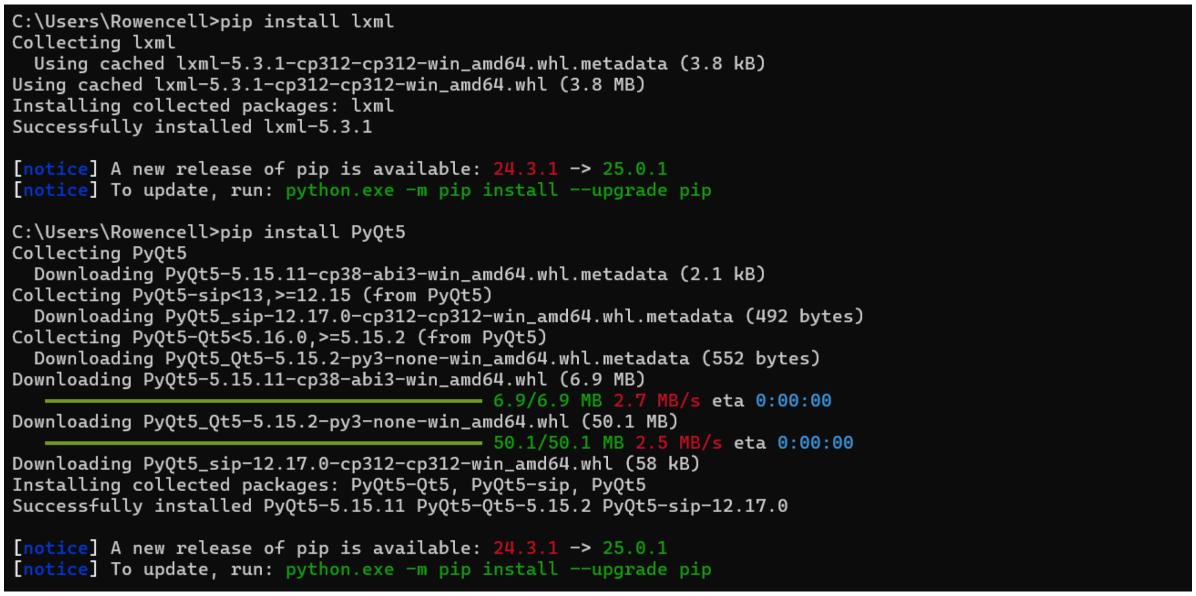
M1-SA1: DATASET AND LABELLING

<u>INSTALLING LABELIMG</u>

Before creating the customized dataset, I first installed `LabelImg`, a lightweight annotation tool that allows objects inside an image to be bounded by a box and adds a label on them. The first step I did was to check if `Python` is installed on my device and determine its version using the command `python -v`. After checking the Python version, I proceeded to install the necessary libraries, `lxml` and `PyQt5`, using the commands `pip install lxml` and `pip install PyQt5` in the command prompt.

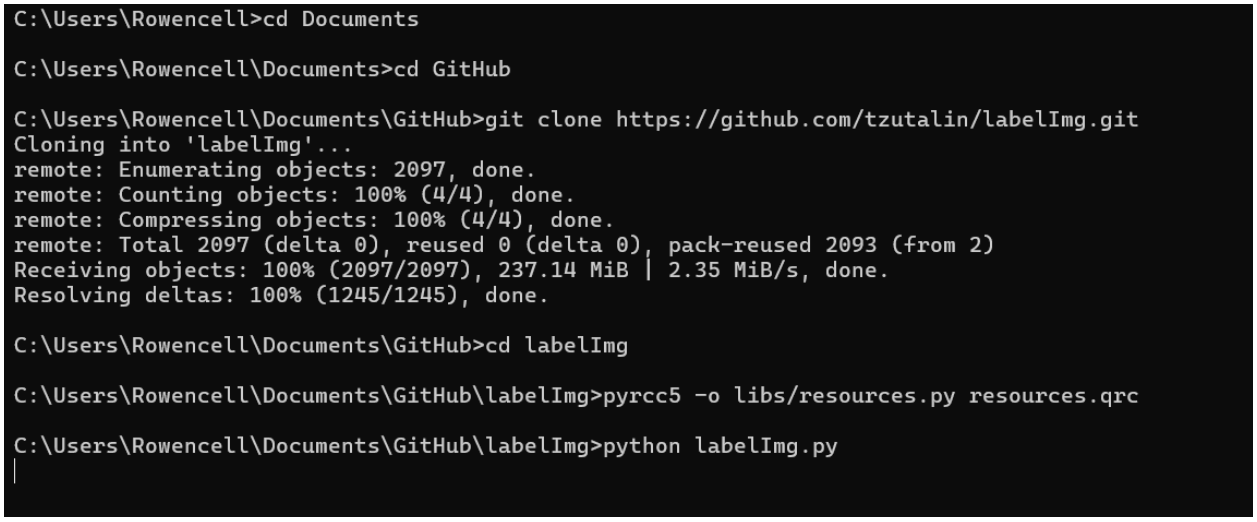


```
C:\Users\Rowencell>python -v
import _frozen_importlib # frozen
import _imp # builtin
import '_thread' # <class '_frozen_importlib.BuiltinImporter'>
import '_warnings' # <class '_frozen_importlib.BuiltinImporter'>
import '_weakref' # <class '_frozen_importlib.BuiltinImporter'>
import 'winreg' # <class '_frozen_importlib.BuiltinImporter'>
import '_io' # <class '_frozen_importlib.BuiltinImporter'>
import 'marshal' # <class '_frozen_importlib.BuiltinImporter'>
import 'nt' # <class '_frozen_importlib.BuiltinImporter'>
import '_frozen_importlib_external' # <class '_frozen_importlib.FrozenImporter'>
# installing zipimport hook
import 'time' # <class '_frozen_importlib.BuiltinImporter'>
import 'zipimport' # <class '_frozen_importlib.FrozenImporter'>
# installed zipimport hook
# C:\Users\Rowencell\AppData\Local\Programs\Python\Python312\Lib\encodings\__pycache__\__init__.cpython-312.pyc matches C:\Users\Rowencell\AppData\Local\Pro
grams\Python\Python312\Lib\encodings\__init__.py
# code object from 'C:\\Users\\Rowencell\\AppData\\Local\\Programs\\Python\\Python312\\Lib\\encodings\\__pycache__\\__init__.cpython-312.pyc'
import '_codecs' # <class '_frozen_importlib.BuiltinImporter'>
import 'codecs' # <class '_frozen_importlib.FrozenImporter'>
# C:\Users\Rowencell\AppData\Local\Programs\Python\Python312\Lib\encodings\__pycache__\aliases.cpython-312.pyc matches C:\Users\Rowencell\AppData\Local\Prog
rams\Python\Python312\Lib\encodings\aliases.py
# code object from 'C:\\Users\\Rowencell\\AppData\\Local\\Programs\\Python\\Python312\\Lib\\encodings\\__pycache__\\aliases.cpython-312.pyc'
import 'encodings.aliases' # <_frozen_importlib_external.SourceFileLoader object at 0x0000027C650F89E0>
import 'encodings' # <_frozen_importlib_external.SourceFileLoader object at 0x0000027C650C6E10>
# code object from 'C:\\Users\\Rowencell\\AppData\\Local\\Programs\\Python\\Python312\\Lib\\__pycache__\\_weakrefset.cpython-312.pyc'
import '_weakrefset' # <_frozen_importlib_external.SourceFileLoader object at 0x0000027C654DFE00>
import 'weakref' # <_frozen_importlib_external.SourceFileLoader object at 0x0000027C654BE450>
import 'inspect' # <_frozen_importlib_external.SourceFileLoader object at 0x0000027C65367F50>
import 'rlcompleter' # <_frozen_importlib_external.SourceFileLoader object at 0x0000027C653678F0>
Python 3.12.5 (tags/v3.12.5:ff3bc82, Aug  6 2024, 20:45:27) [MSC v.1940 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>>
```



```
C:\Users\Rowencell>pip install lxml
Collecting lxml
  Using cached lxml-5.3.1-cp312-cp312-win_amd64.whl.metadata (3.8 kB)
Using cached lxml-5.3.1-cp312-cp312-win_amd64.whl (3.8 MB)
Installing collected packages: lxml
Successfully installed lxml-5.3.1

[notice] A new release of pip is available: 24.3.1 -> 25.0.1
[notice] To update, run: python.exe -m pip install --upgrade pip

C:\Users\Rowencell>pip install PyQt5
Collecting PyQt5
  Downloading PyQt5-5.15.11-cp38-abi3-win_amd64.whl.metadata (2.1 kB)
Collecting PyQt5-sip<13,>=12.15 (from PyQt5)
  Downloading PyQt5_sip-12.17.0-cp312-cp312-win_amd64.whl.metadata (492 bytes)
Collecting PyQt5-Qt5<5.16.0,>=5.15.2 (from PyQt5)
  Downloading PyQt5_Qt5-5.15.2-py3-none-win_amd64.whl.metadata (552 bytes)
Downloading PyQt5-5.15.11-cp38-abi3-win_amd64.whl (6.9 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 6.9/6.9 MB 2.7 MB/s eta 0:00:00
Downloading PyQt5_Qt5-5.15.2-py3-none-win_amd64.whl (50.1 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 50.1/50.1 MB 2.5 MB/s eta 0:00:00
Downloading PyQt5_sip-12.17.0-cp312-cp312-win_amd64.whl (58 kB)
Installing collected packages: PyQt5-Qt5, PyQt5-sip, PyQt5
Successfully installed PyQt5-5.15.11 PyQt5-Qt5-5.15.2 PyQt5-sip-12.17.0

[notice] A new release of pip is available: 24.3.1 -> 25.0.1
[notice] To update, run: python.exe -m pip install --upgrade pip
```

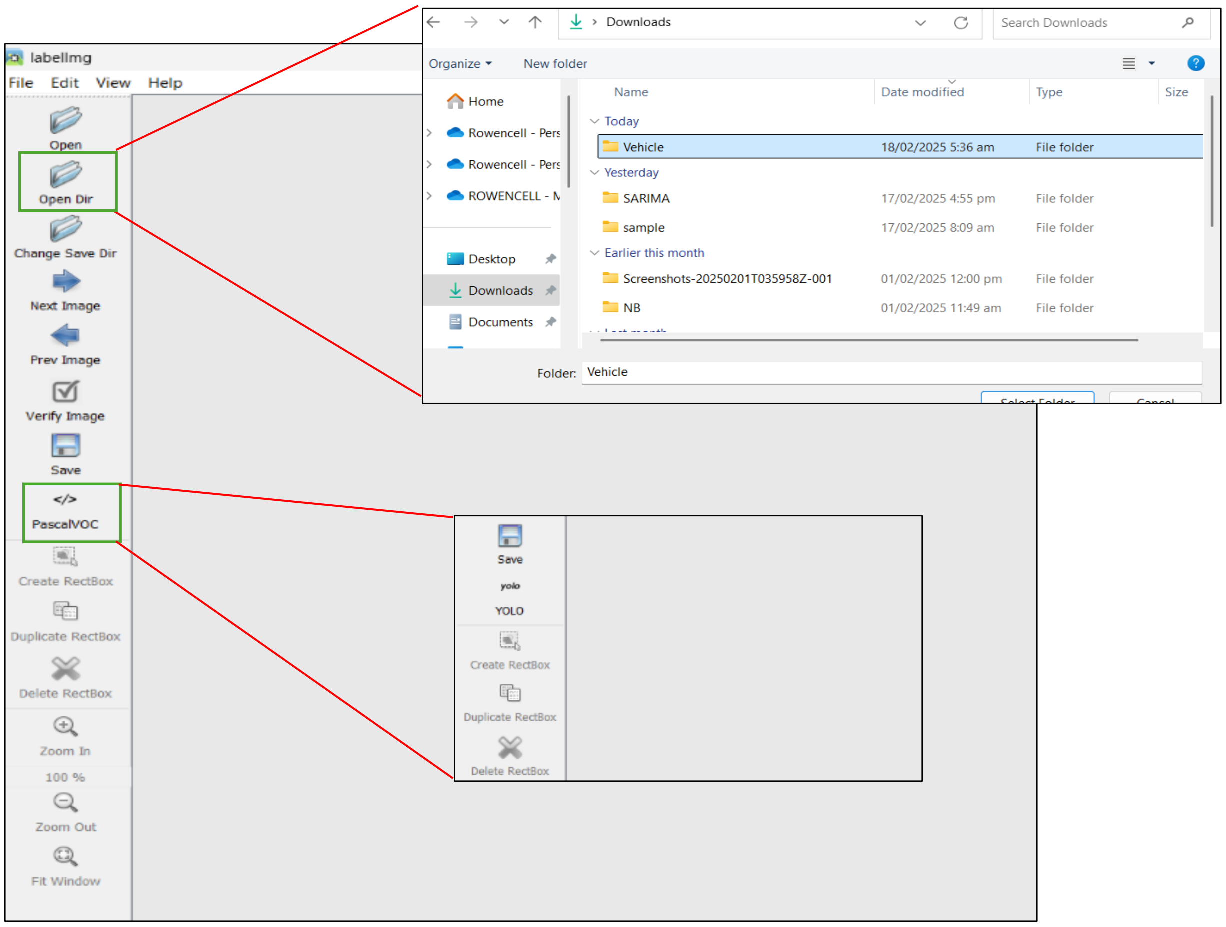
On a separate tab, I accessed the `GitHub` folder in my `Documents` and downloaded the `LabelImg` directory using the command `git clone` https://github.com/HumanSignal/labelImg.git. Inside the `GitHub` folder, I accessed the `LabelImg` folder and ran the command `pyrcc5 -o libs/resources.py resources.qrc` to compile the `Qt resource file` into a `Python file`. This command will allow `LabelImg` to properly load its icon and images. Finally, I used the command `python labelImg.py` to launch the `LabelImg` application.



```
C:\Users\Rowencell>cd Documents

C:\Users\Rowencell\Documents>cd GitHub

C:\Users\Rowencell\Documents\GitHub>git clone https://github.com/tzutalin/labelImg.git
Cloning into 'labelImg'...
remote: Enumerating objects: 2097, done.
remote: Counting objects: 100% (4/4), done.
remote: Compressing objects: 100% (4/4), done.
remote: Total 2097 (delta 0), reused 0 (delta 0), pack-reused 2093 (from 2)
Receiving objects: 100% (2097/2097), 237.14 MiB | 2.35 MiB/s, done.
Resolving deltas: 100% (1245/1245), done.

C:\Users\Rowencell\Documents\GitHub>cd labelImg

C:\Users\Rowencell\Documents\GitHub\labelImg>pyrcc5 -o libs/resources.py resources.qrc

C:\Users\Rowencell\Documents\GitHub\labelImg>python labelImg.py
|
```

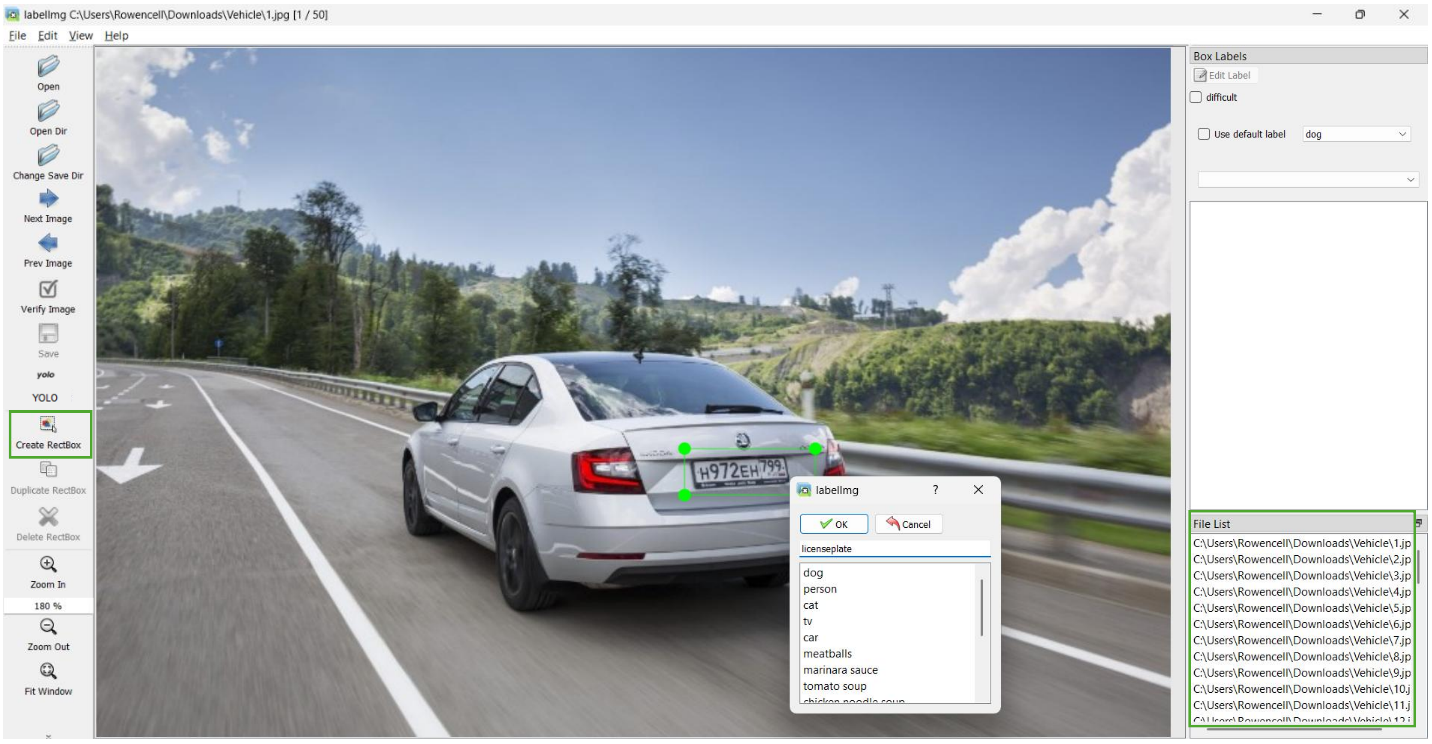
CREATING BOUNDING BOXES

After successfully opening `LabelImg`, I changed the bounding boxes for annotation from `PascalVoc` to `YOLO` by clicking the `PascalVoc` button on the left menu. Then I clicked the `Open Dir` icon on the left menu of the application and loaded the `Vehicles` folder. This folder contains 50 downloaded random images of vehicles that show their license plates.

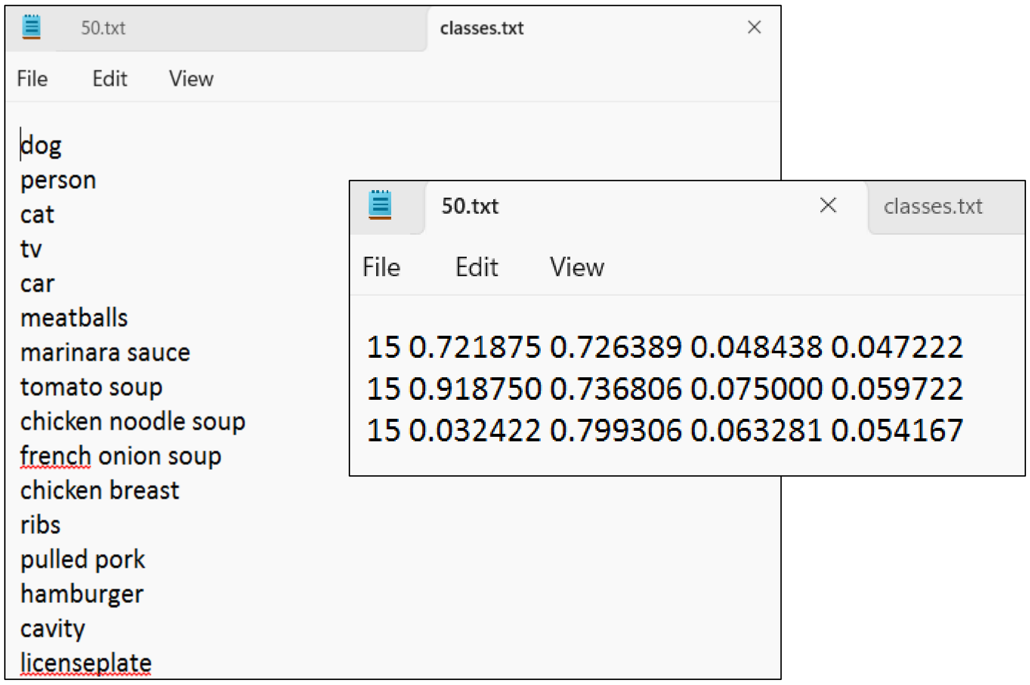


Once the images are properly loaded on the canvas, I clicked the `Create RectBox` on the left menu and drew bounding boxes on the vehicle's plate. I used a customized label `'licenseplate'` as its class. I repeated the same process of drawing bounding boxes on every image until I finished the files in the `File List`. After I finished in the last image, I clicked the

`Vehicles` folder and noticed that there are `txt` files inside it. This text file contains the class and the dimensions of the bounding boxes in each image. The number 15 pertains to the `16th class`, `licenseplate`, inside the `class.txt` file.



labelImg C:\Users\Rowencell\Downloads\Vehicle\1.jpg [1 / 50]
File
Edit
View
Help
Open
Open Dir
Change Save Dir
Next Image
Prev Image
Verify Image
Save
YOLO
Create RectBox
Duplicate RectBox
Delete RectBox
Zoom In
180 %
Zoom Out
Fit Window
Box Labels
Edit Label
difficult
Use default label
dog
labelImg
OK
Cancel
licenseplate
dog
person
cat
tv
car
meatballs
marinara sauce
tomato soup
File List
C:\Users\Rowencell\Downloads\Vehicle\1.jp
C:\Users\Rowencell\Downloads\Vehicle\2.jp
C:\Users\Rowencell\Downloads\Vehicle\3.jp
C:\Users\Rowencell\Downloads\Vehicle\4.jp
C:\Users\Rowencell\Downloads\Vehicle\5.jp
C:\Users\Rowencell\Downloads\Vehicle\6.jp
C:\Users\Rowencell\Downloads\Vehicle\7.jp
C:\Users\Rowencell\Downloads\Vehicle\8.jp
C:\Users\Rowencell\Downloads\Vehicle\9.jp
C:\Users\Rowencell\Downloads\Vehicle\10.j
C:\Users\Rowencell\Downloads\Vehicle\11.j

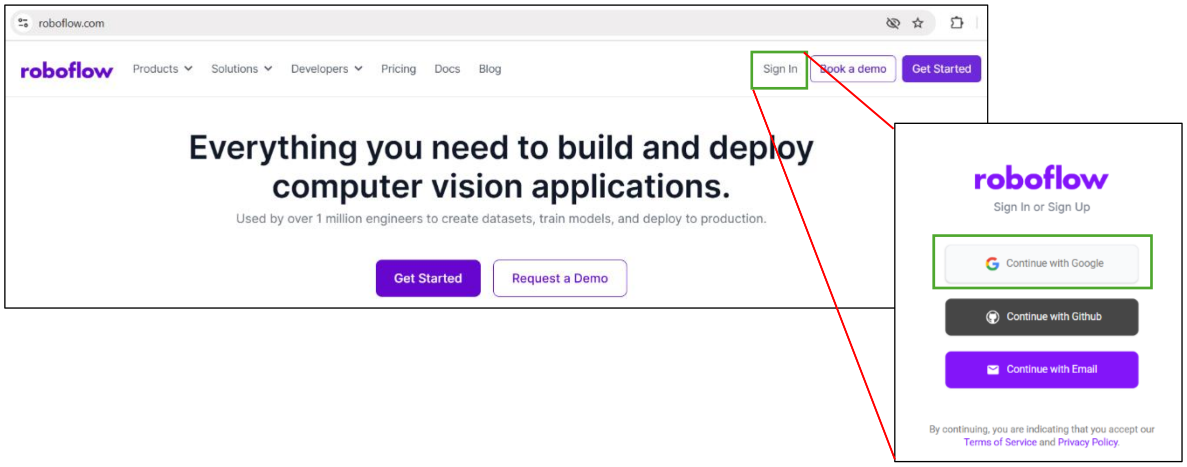


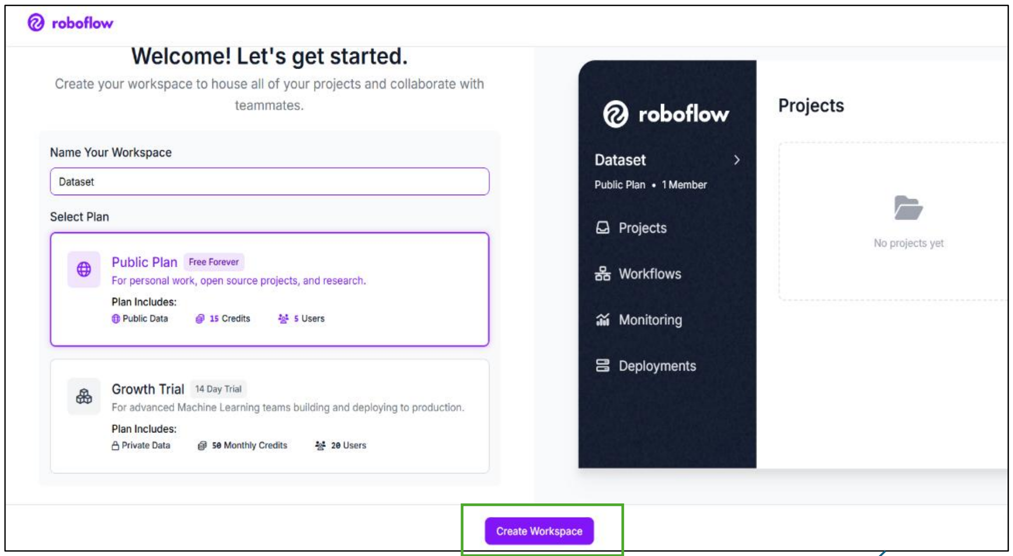
```
dog
person
cat
tv
car
meatballs
marinara sauce
tomato soup
chicken noodle soup
french onion soup
chicken breast
ribs
pulled pork
hamburger
cavity
licenseplate
```

```
15 0.721875 0.726389 0.048438 0.047222
15 0.918750 0.736806 0.075000 0.059722
15 0.032422 0.799306 0.063281 0.054167
```

<u>CREATING THE DATASET</u>

After checking the `txt file`, the next step is to create the dataset from the `Vehicle` folder on `Roboflow`. `Roboflow` is a computer vision developer framework used by people for better data collection, preprocessing, and even model training techniques. It provides a public dataset for users and allows them to upload their own custom data. I accessed the website using the link `https://roboflow.com/`, and the first procedure I undertook was to create an account by clicking the `Sign In` button. It redirected me on its `Login page`, and I used my `Google account` for signing in. Afterwards, I clicked `Name My workspace`, and entered `Dataset`, selected a `public plan`, and clicked the `Create Workspace` button. On the `Project page`, I clicked `New Project` and chose `Vehicle Dataset` as the `project name` and `licenseplate` for the `annotation group`. I chose `Object Detection` as the `project type` and clicked the `Create Public Project` button.


roboflow.com
roboflow
Products
Solutions
Developers
Pricing
Docs
Blog
Sign In
Book a demo
Get Started
Everything you need to build and deploy computer vision applications.
Used by over 1 million engineers to create datasets, train models, and deploy to production.
Get Started
Request a Demo
roboflow
Sign In or Sign Up
Continue with Google
Continue with Github
Continue with Email
By continuing, you are indicating that you accept our Terms of Service and Privacy Policy.



roboflow

Welcome! Let's get started.

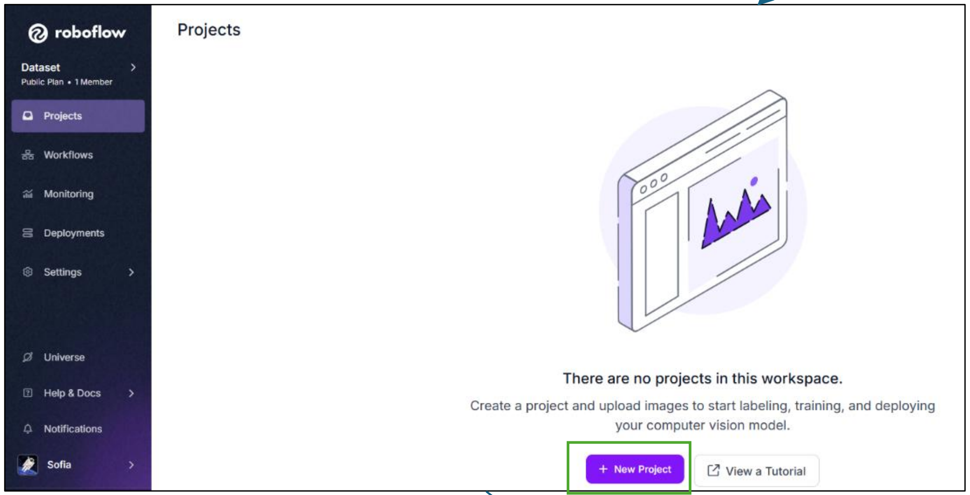
Create your workspace to house all of your projects and collaborate with teammates.

Name Your Workspace: Dataset

Select Plan

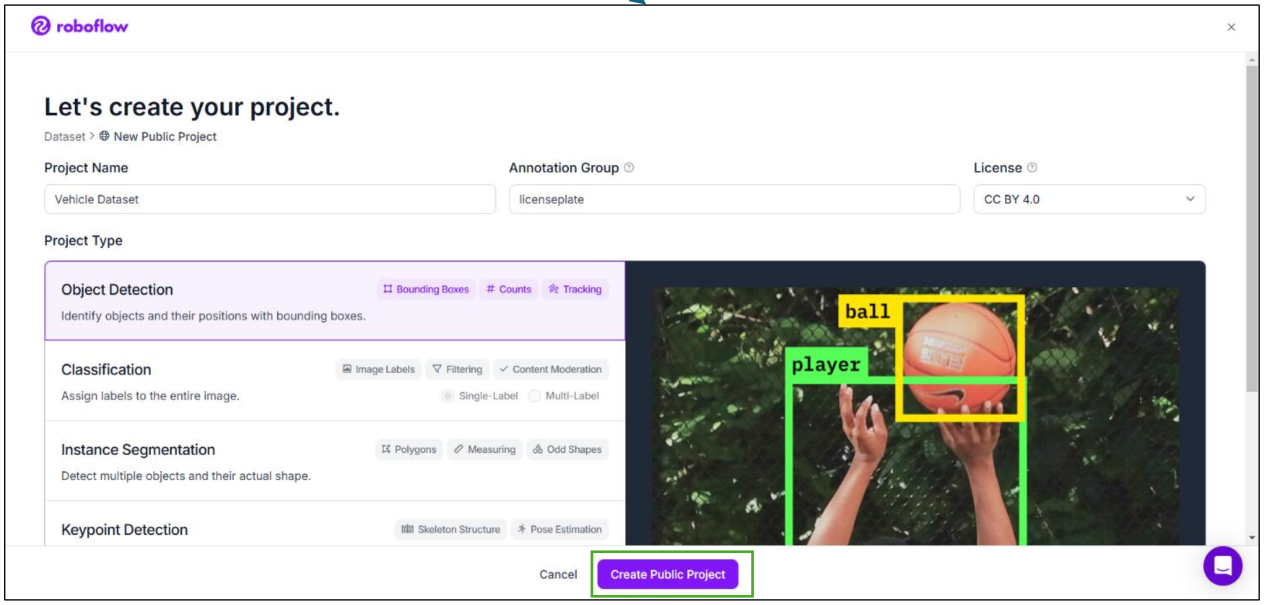
Public Plan — Free Forever
For personal work, open source projects, and research.
Plan Includes: Public Data · 15 Credits · 5 Users

Growth Trial — 14 Day Trial
For advanced Machine Learning teams building and deploying to production.
Plan Includes: Private Data · 50 Monthly Credits · 20 Users



There are no projects in this workspace.

Create a project and upload images to start labeling, training, and deploying your computer vision model.



roboflow

Let's create your project.

Dataset > New Public Project

Project Name: Vehicle Dataset

Annotation Group: licenseplate

License: CC BY 4.0

Project Type

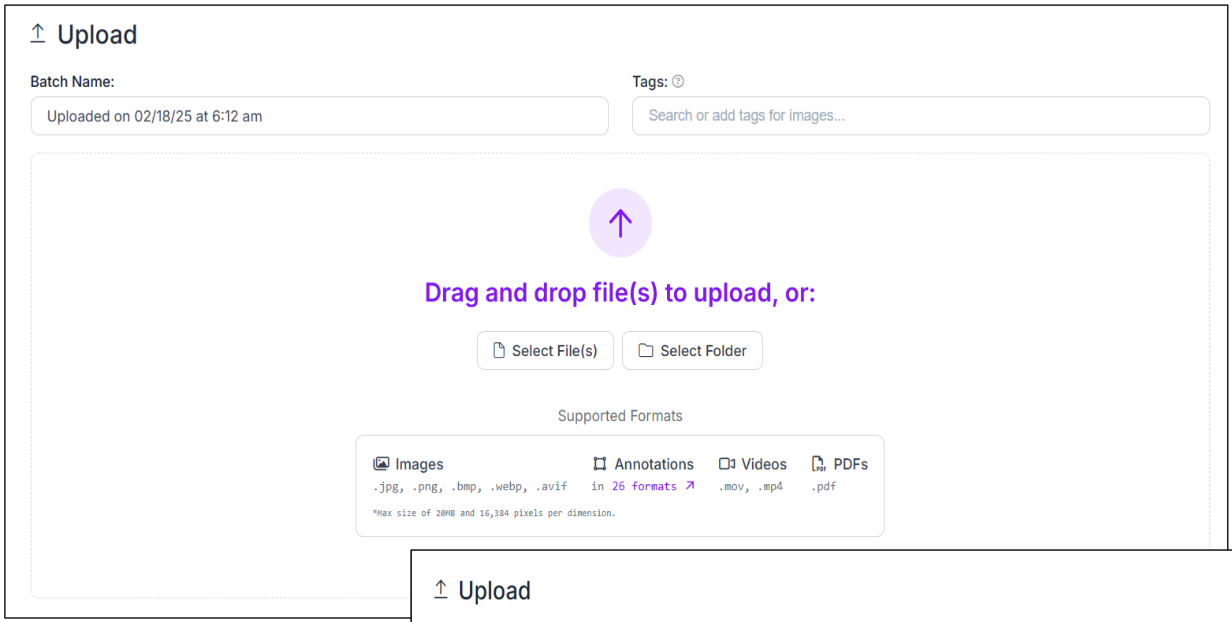
Object Detection — Bounding Boxes · Counts · Tracking
Identify objects and their positions with bounding boxes.

Classification — Image Labels · Filtering · Content Moderation
Assign labels to the entire image. Single-Label · Multi-Label

Instance Segmentation — Polygons · Measuring · Odd Shapes
Detect multiple objects and their actual shape.

Keypoint Detection — Skeleton Structure · Pose Estimation

I dragged the `Vehicle` folder into the `Upload` page, and `Roboflow` started processing my files. Once done, I chose the `default option` in splitting the image (`Splitting Images Between Train/Valid and Test`) and clicked the `Continue` button to continue the process. Afterwards, the process of uploading the files started. Subsequently, the `Generate a Dataset Version` page appeared, I chose all the `default options` and then clicked the `Create` button to continue the process. I renamed the model as `License Plate` and clicked the `Download Dataset` version. I selected the `YOLOv11` format and the option `Show Download Code`, then clicked `Continue`. I clicked the `Raw URL` button, and the link for the customized dataset I created appeared.



Upload

Batch Name: Uploaded on 02/18/25 at 6:12 am

Tags: Search or add tags for images...

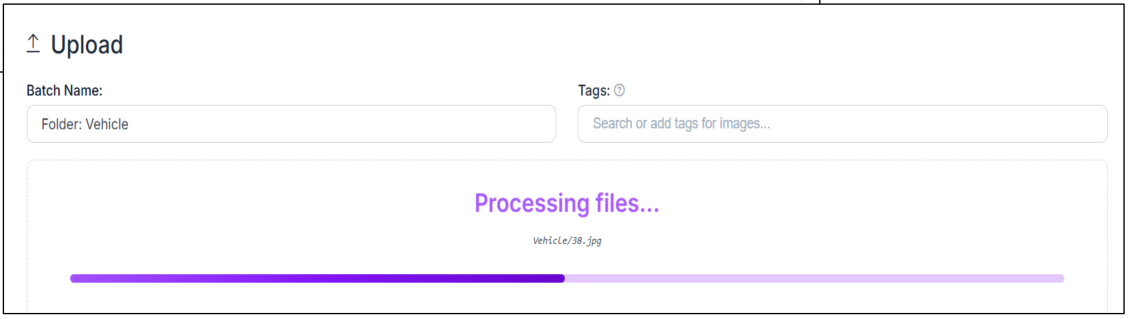
Drag and drop file(s) to upload, or:

Select File(s) | Select Folder

Supported Formats

Images .jpg, .png, .bmp, .webp, .avif | Annotations in 26 formats | Videos .mov, .mp4 | PDFs .pdf

*Max size of 20MB and 16,384 pixels per dimension.



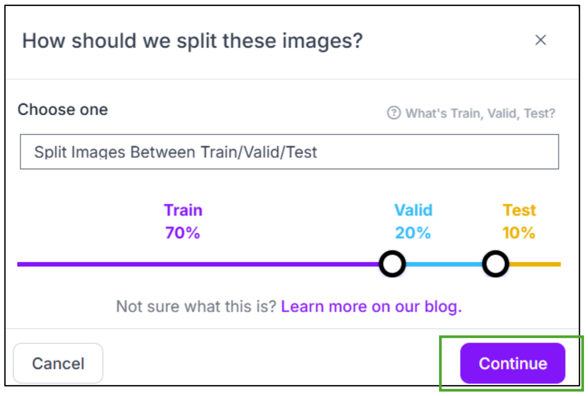
Upload

Batch Name: Folder: Vehicle

Tags: Search or add tags for images...

Processing files...

Vehicle/38.jpg



How should we split these images?

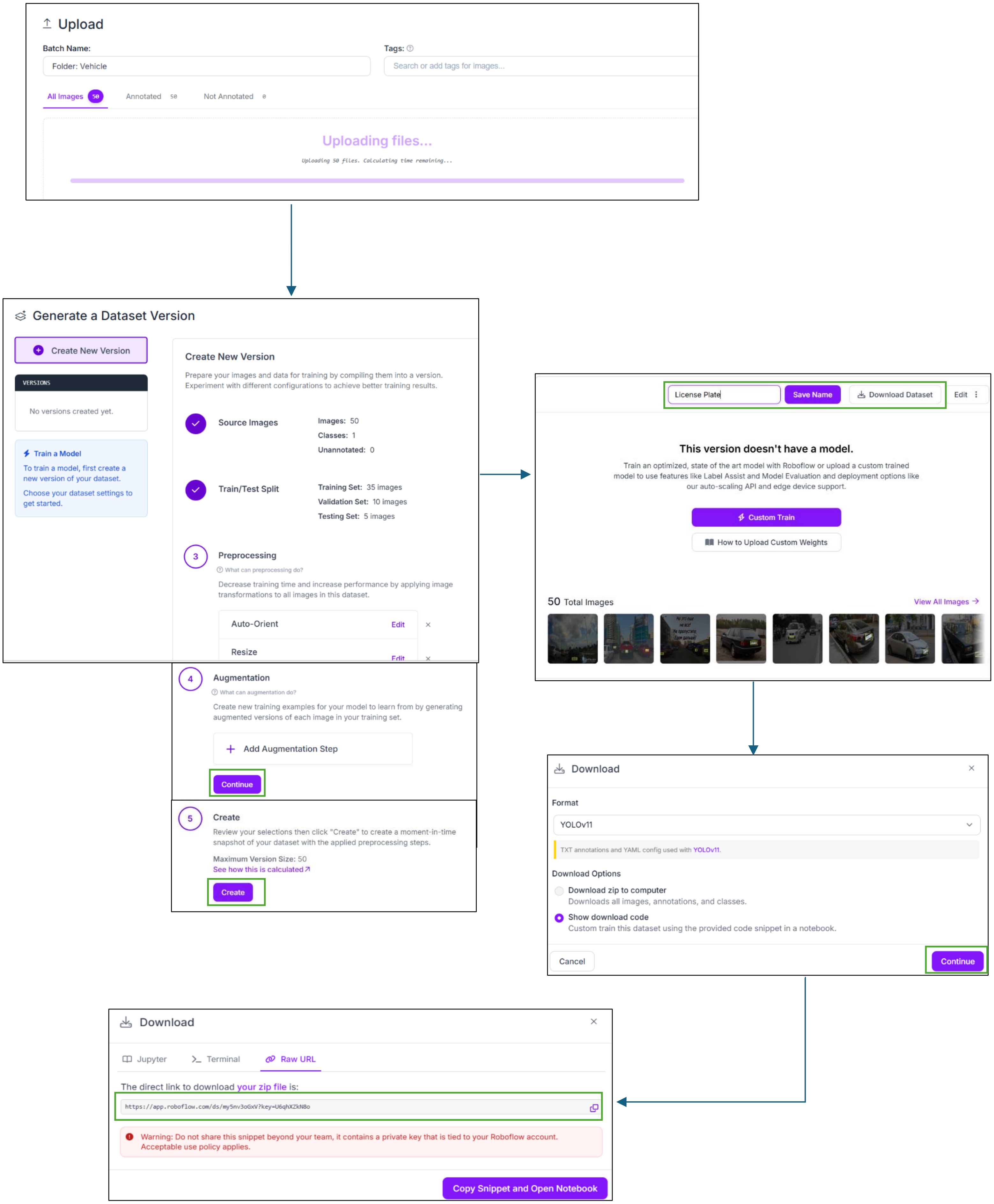
Choose one — What's Train, Valid, Test?

Split Images Between Train/Valid/Test

Train 70% | Valid 20% | Test 10%

Not sure what this is? Learn more on our blog.

Cancel | Continue



Upload

Batch Name: Folder: Vehicle

Tags: Search or add tags for images...

All Images 50 · Annotated 50 · Not Annotated 0

Uploading files...

Uploading 50 files. Calculating time remaining...

Generate a Dataset Version

Create New Version

VERSIONS

No versions created yet.

Train a Model

To train a model, first create a new version of your dataset.

Choose your dataset settings to get started.

Create New Version

Prepare your images and data for training by compiling them into a version. Experiment with different configurations to achieve better training results.

Source Images — Images: 50, Classes: 1, Unannotated: 0

Train/Test Split — Training Set: 35 images, Validation Set: 10 images, Testing Set: 5 images

3 Preprocessing

What can preprocessing do?

Decrease training time and increase performance by applying image transformations to all images in this dataset.

Auto-Orient Edit

Resize Edit

4 Augmentation

What can augmentation do?

Create new training examples for your model to learn from by generating augmented versions of each image in your training set.

Add Augmentation Step

Continue

5 Create

Review your selections then click "Create" to create a moment-in-time snapshot of your dataset with the applied preprocessing steps.

Maximum Version Size: 50

See how this is calculated

Create

License Plate · Save Name · Download Dataset · Edit

This version doesn't have a model.

Train an optimized, state of the art model with Roboflow or upload a custom trained model to use features like Label Assist and Model Evaluation and deployment options like our auto-scaling API and edge device support.

Custom Train

How to Upload Custom Weights

50 Total Images · View All Images →

Download

Format: YOLOv11

TXT annotations and YAML config used with YOLOv11.

Download Options

Download zip to computer — Downloads all images, annotations, and classes.

[✓ Show download code] — Custom train this dataset using the provided code snippet in a notebook.

Cancel · Continue

Download

Jupyter · Terminal · Raw URL

The direct link to download your zip file is:

```
https://app.roboflow.com/ds/my5nv3oGxV?key=U6qhXZkN8o
```

Warning: Do not share this snippet beyond your team, it contains a private key that is tied to your Roboflow account. Acceptable use policy applies.

Copy Snippet and Open Notebook

REFERENCES:

Bhattacharyya, J. (2024, December 30). *Step by step guide to object detection using Roboflow*. Analytics India Magazine. https://analyticsindiamag.com/deep-tech/step-by-step-guide-to-object-detection-using-roboflow/

Boesch, G. (2024, July 23). *LabelImg for image annotation*. viso.ai. https://viso.ai/computer-vision/labelimg-for-image-annotation/

Marek, T. (2019). Ubuntu Manpage: Pyrcc5 - compile Qt resource files for pyqt5 applications. https://manpages.ubuntu.com/manpages/jammy/man1/pyrcc5.1.html?utm_source=chatgpt.com