

YOLO v5를 이용한  
실시간 객체 탐지

# Quick Start Examples

- 오픈 소스 저장소
  - <https://github.com/ultralytics/yolov5>

- 설치

```
% git clone https://github.com/ultralytics/yolov5 # clone
```

```
% cd yolov5
```

```
% pip install -r requirements.txt # install
```

# Inference

```
import torch

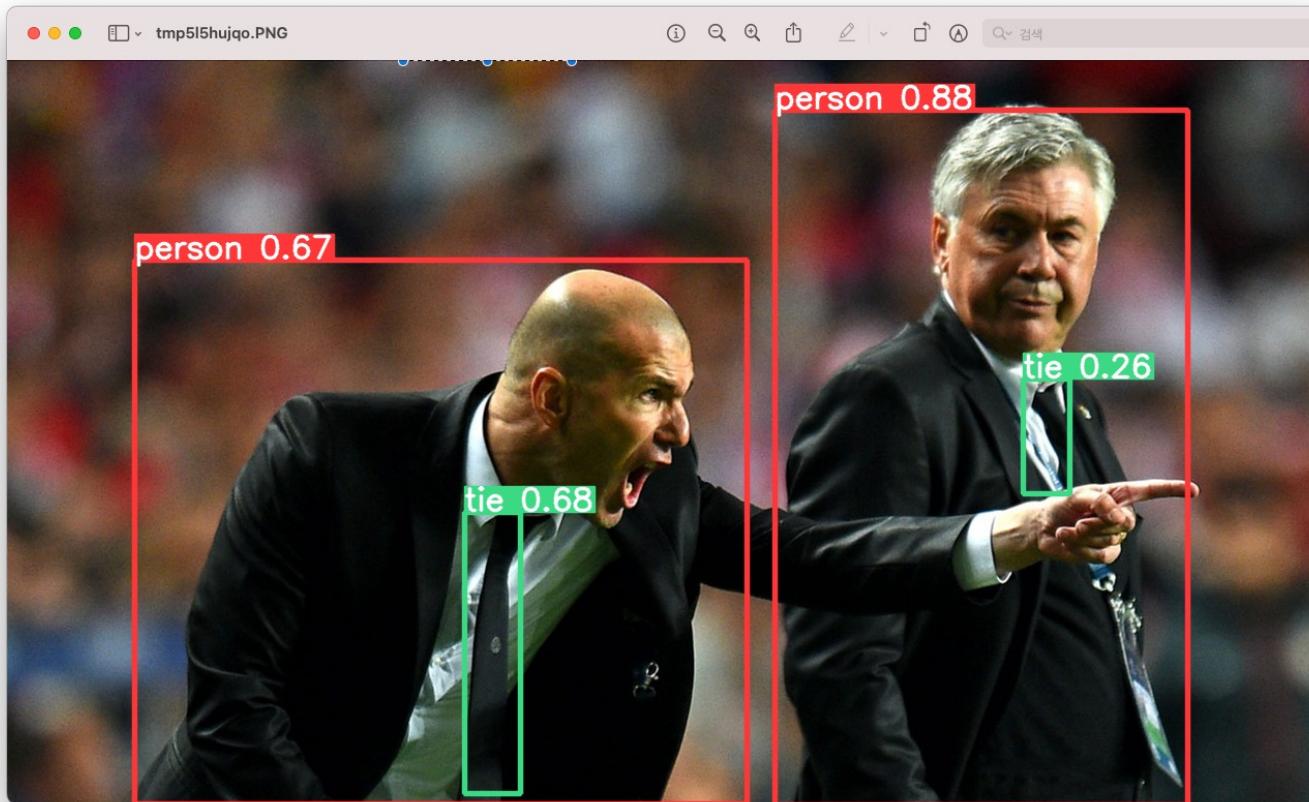
# Model
model = torch.hub.load('ultralytics/yolov5', 'yolov5s') # or yolov5n - y
olov5x6, custom

# Images
img = 'https://ultralytics.com/images/zidane.jpg' # or file, Path, PIL,
OpenCV, numpy, list

# Inference
results = model(img)

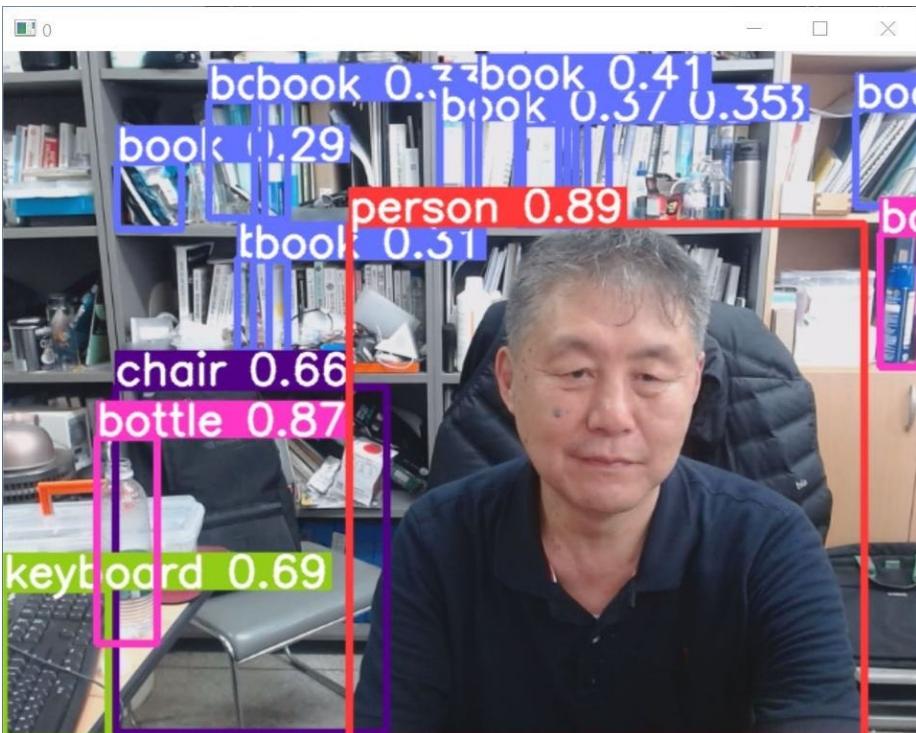
# Results
results.print() # or .show(), .save(), .crop(), .pandas(), etc.
```

# Inference



# Inference with detect.py

```
% python detect.py --source 0  # webcam  
                          img.jpg  # image  
                          vid.mp4  # video  
                          path/  # directory  
                          path/*.jpg  # glob  
                          'https://youtu.be/Zgi9g1ksQHc'  # YouTube  
                          'rtsp://example.com/media.mp4'  # RTSP, RTMP, HTTP stream
```



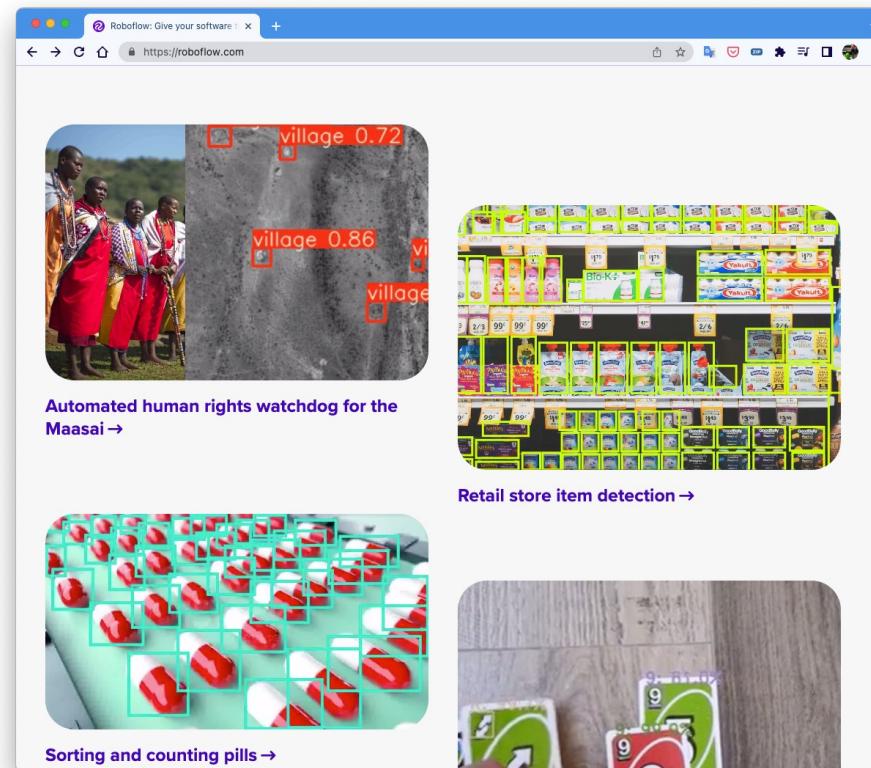
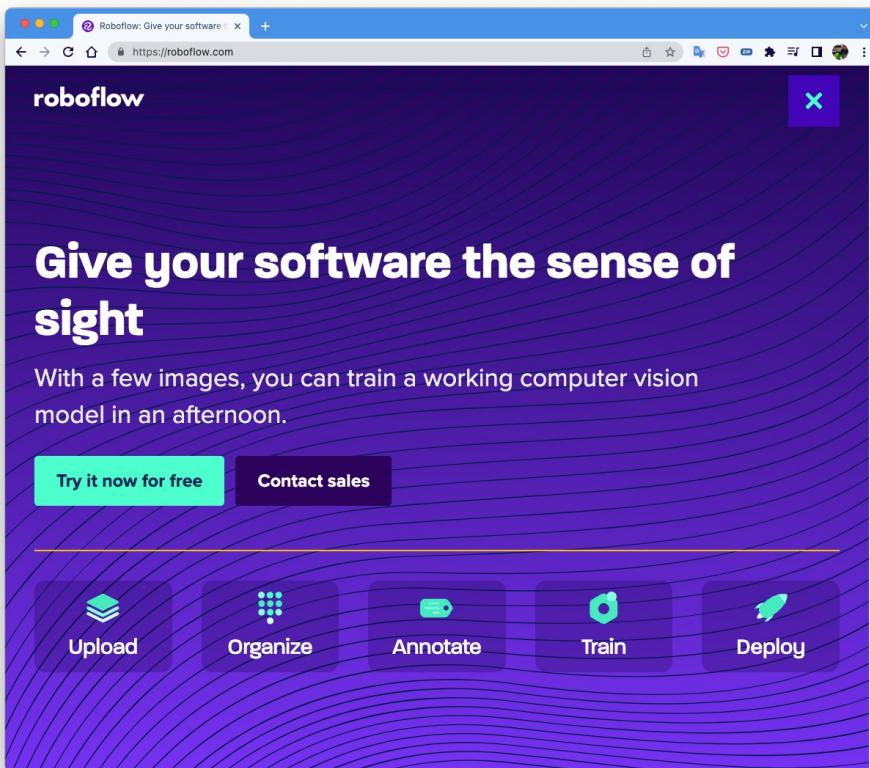
# Train Custom Data

- <https://github.com/ultralytics/yolov5/wiki/Train-Custom-Data>
- Open in Colab
  - <https://colab.research.google.com/github/roboflow-ai/yolov5-custom-training-tutorial/blob/main/yolov5-custom-training.ipynb>



# 데이터 수집 및 전처리

- roboflow
  - <https://roboflow.com>
  - 계정 생성 : Sign up for free



# Worksapce/ Project 만들기

The screenshot shows a user interface for creating a workspace or project. At the top, there is a navigation bar with links for Projects, Universe, Documentation, Forum, and a user profile for JongHyun Kim. A red circle highlights the 'Projects' tab.

On the left side, there is a sidebar with the following menu items:

- WORKSPACES (highlighted with a red oval)
- yolo5test (highlighted with a blue oval)
- studentprojects
- + Add Workspace (highlighted with a red oval)

Below the sidebar, there are sections for RESOURCES, Getting Started, Tutorials, Public Datasets & Models, Model Library, and Help & Support.

The main area displays a workspace named "yolo5test". It includes a header with a globe icon, the workspace name, a user icon (J), and an "Invite" button. Below the header, there is a "Create New Project" button with a plus sign.

Three projects are listed:

- Mask Wearing**: Private, Modified 3 days ago. Preview image shows two people wearing masks.
- COVID-MASK**: Public, Modified a month ago. Preview image shows three mannequin heads wearing various masks.
- Car License Plate**: Public, Modified a month ago. Preview image shows several car license plates.

At the bottom, there is a preview image of a person wearing a hard hat, labeled "Hard Hat Sample".

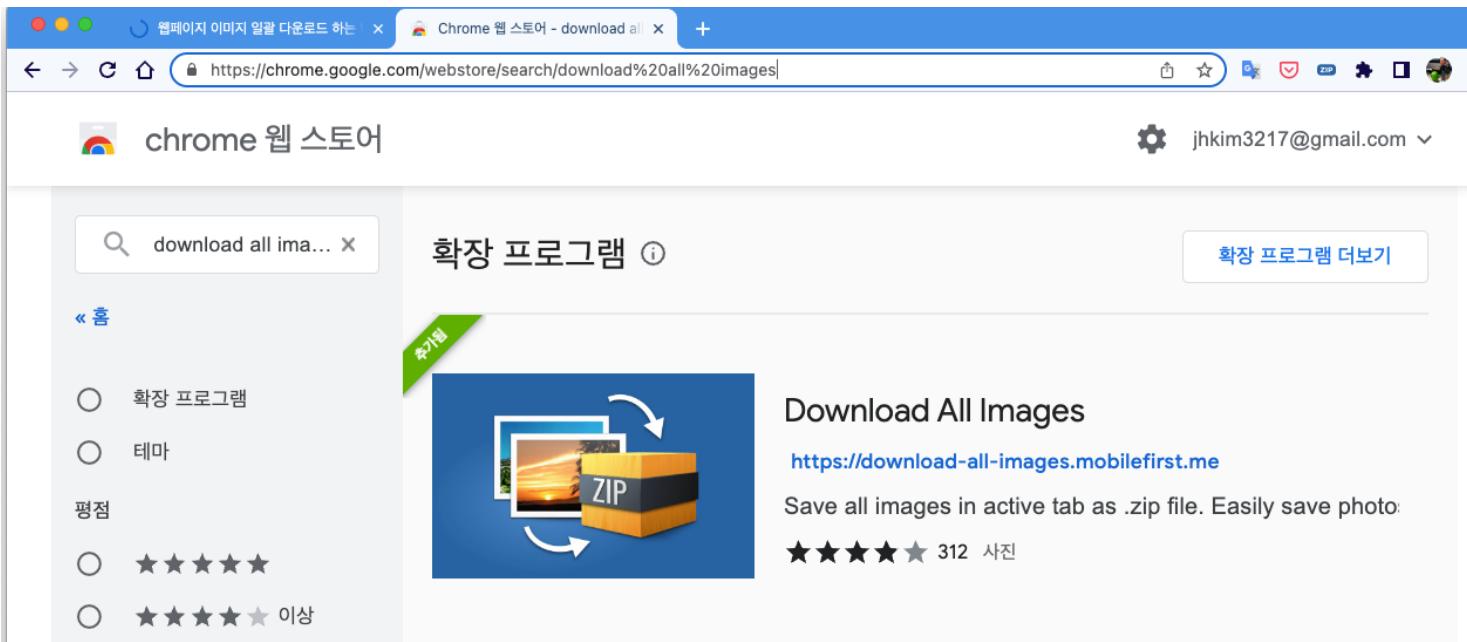
Handwritten annotations in red:

- An arrow points from the word "Workspace" to the "WORKSPACES" link in the sidebar.
- An arrow points from the word "Project" to the "yolo5test" workspace in the sidebar.
- An arrow points from the text "workspace 새로 만들기" to the "+ Add Workspace" button in the sidebar.

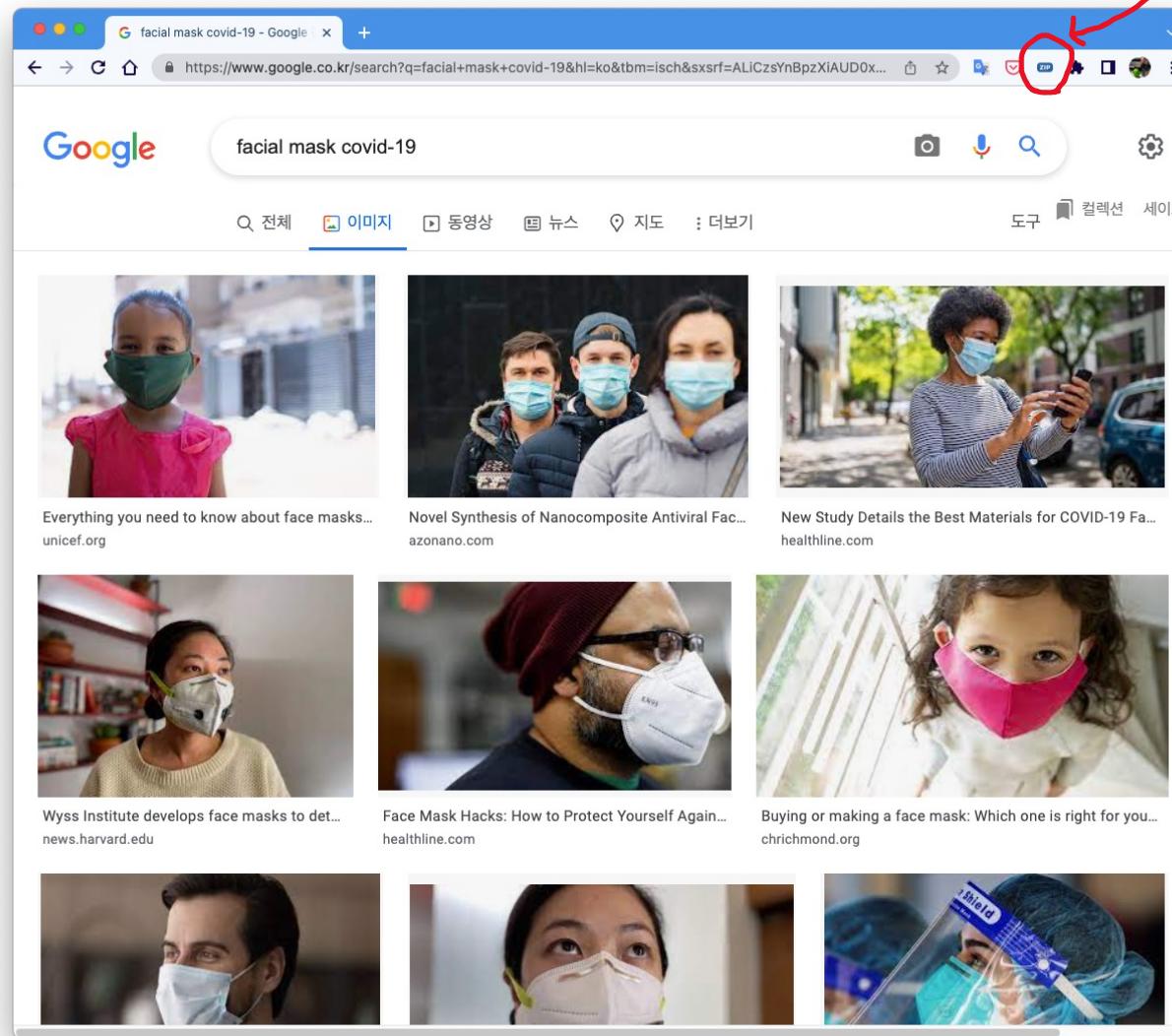
# 데이터 수집 : 구글 이미지 검색

- Chrome 웹 스토어 : Download All Images

- <https://chrome.google.com/webstore/search/download%20all%20images>

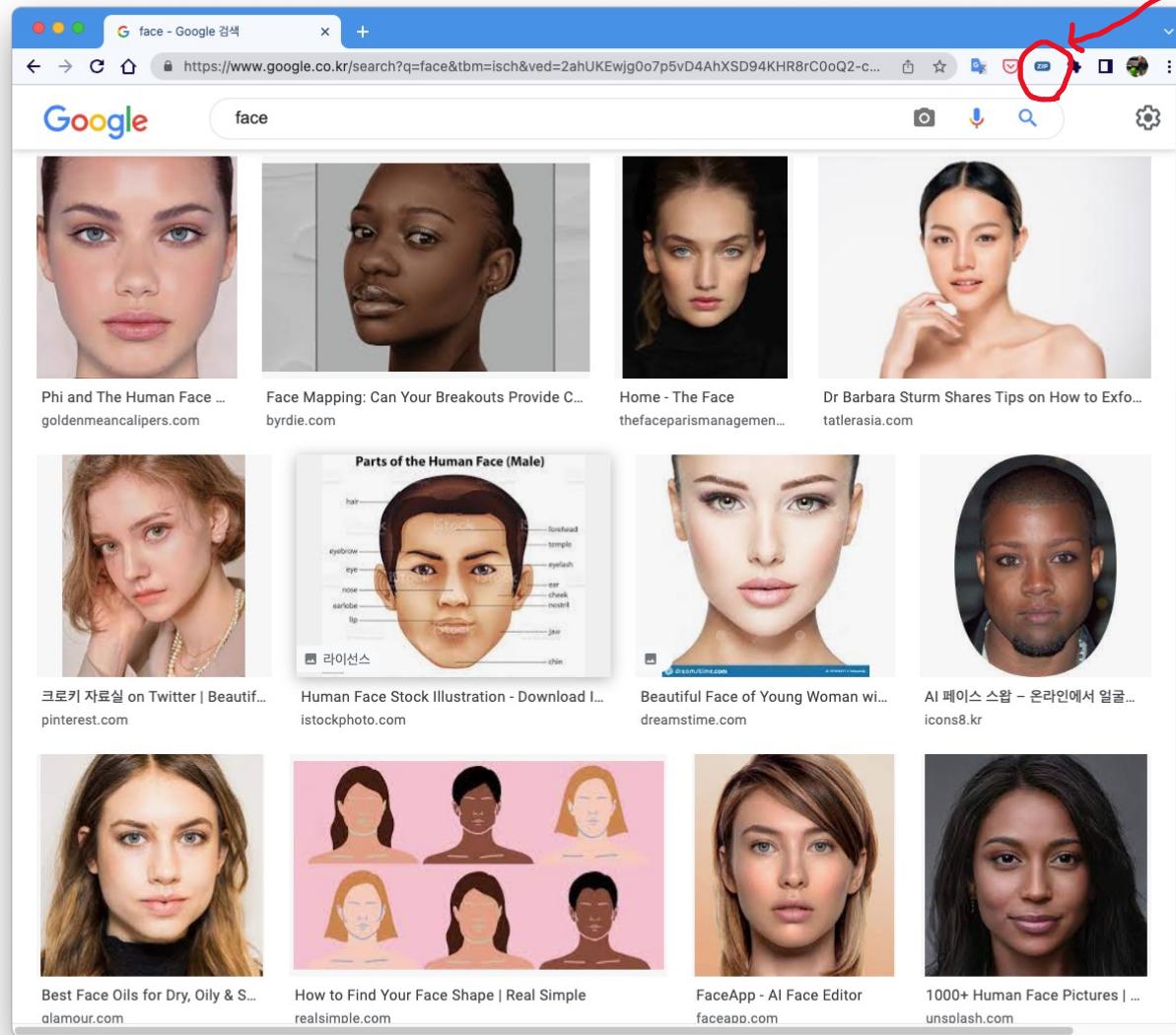


# 데이터 수집 : 구글 이미지 검색



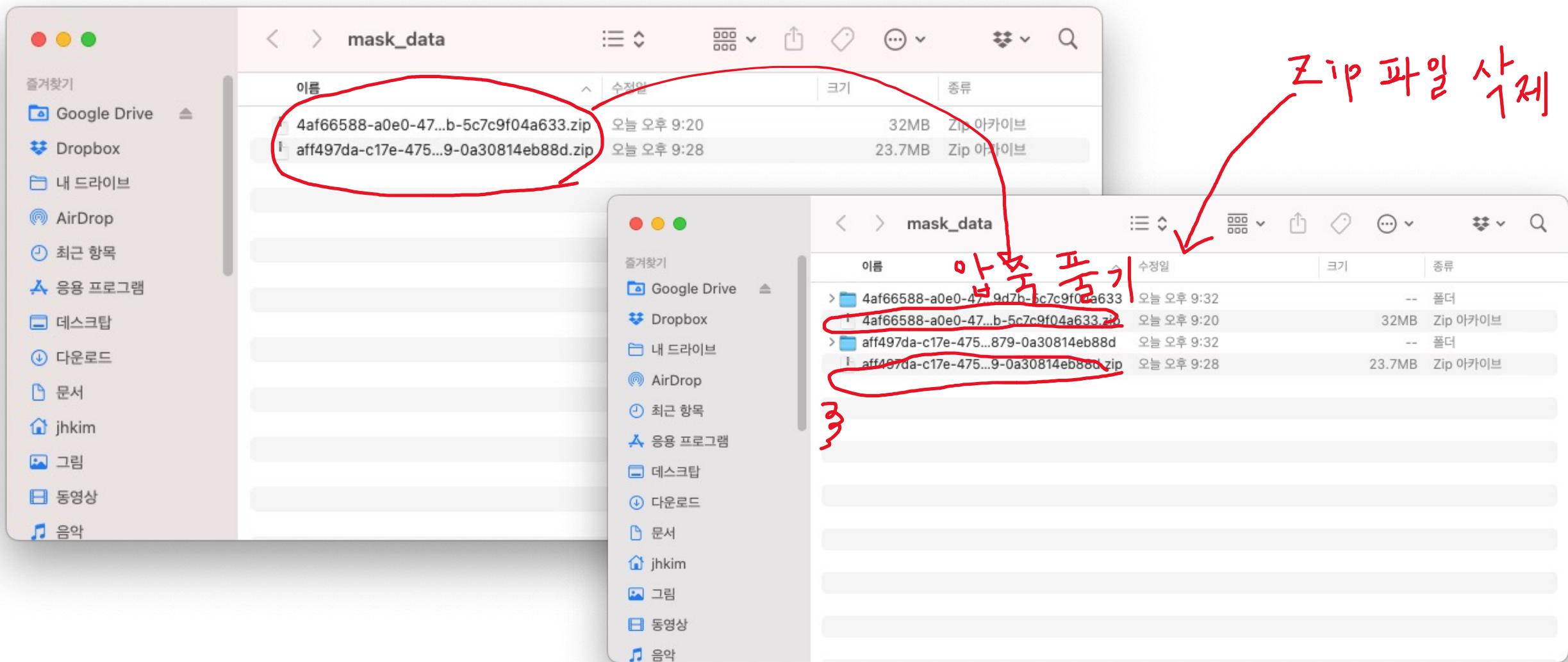
(ZIP)  
전체 이미지 다운로드  
클릭

# 데이터 수집 : 구글 이미지 검색



(zip)  
전체 이미지 다운로드  
클릭

# 데이터 수집 : 구글 이미지 검색

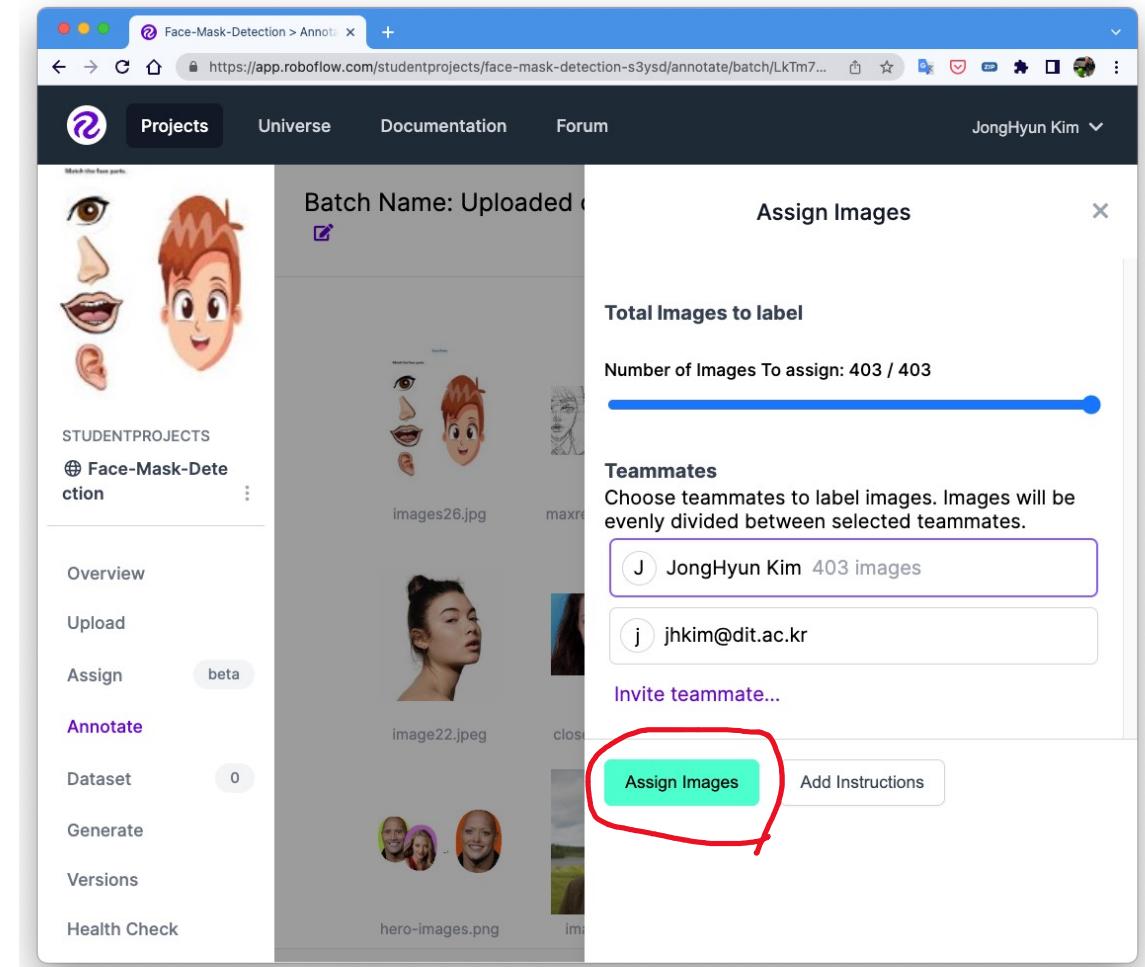
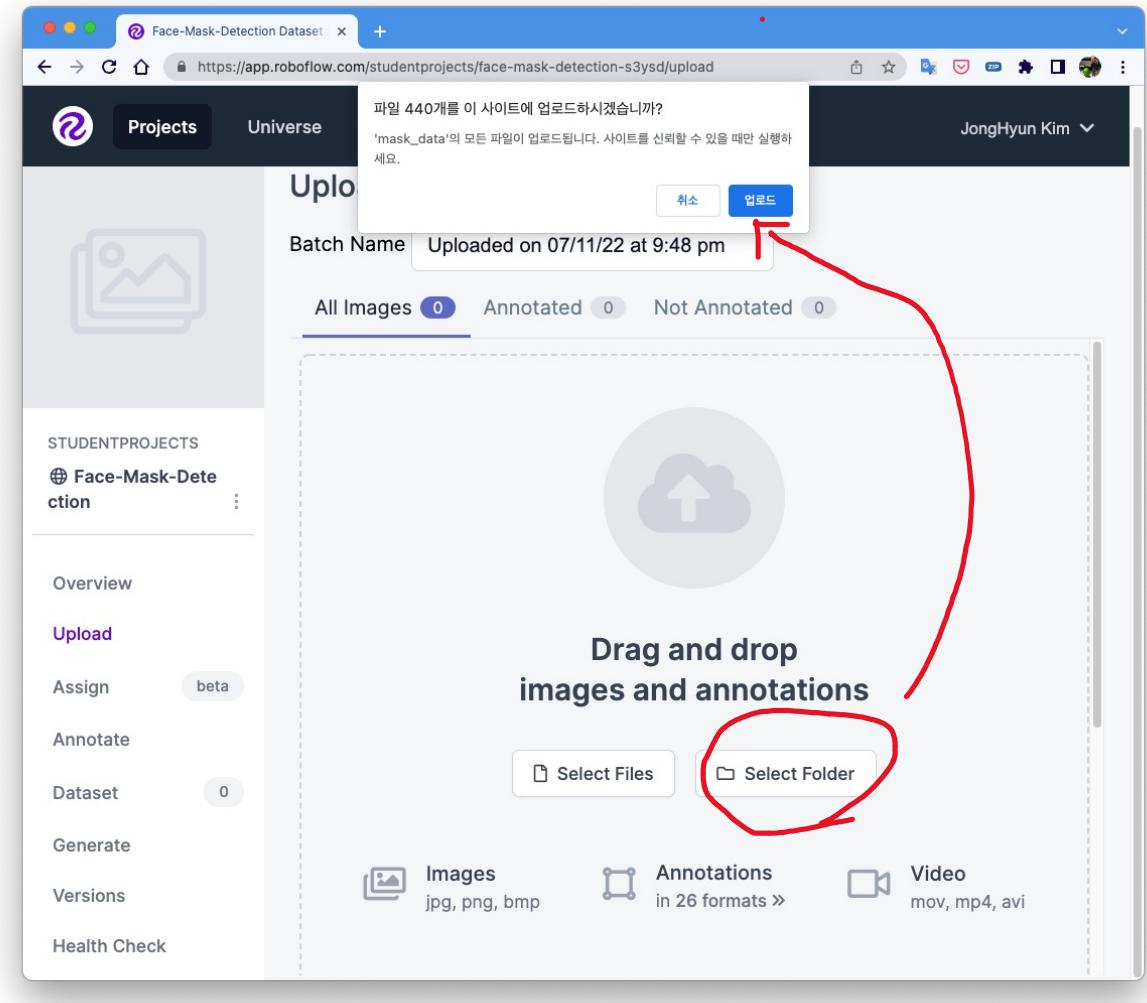


# Workspace -> project 만들기

The screenshot shows the Roboflow Workspace Home page. On the left, there's a sidebar with sections for WORKSPACES (yolo5test, New Workspace, studentprojects), RESOURCES (Getting Started, Tutorials, Public Datasets & Models, Model Library, Help & Support), and a link to the Create Project page (<https://app.roboflow.com/studentprojects/create>). The main area displays the 'studentprojects' workspace, which contains a 'Create New Project' button and a thumbnail for the 'Deep Bakery' project.

The screenshot shows the 'Create Project' dialog box. It includes fields for Project Name (Face-Mask-Detection), License (CC BY 4.0), and Project Type (Object Detection (Bounding Box)). A question 'What will your model predict?' has 'mask' typed into its input field. At the bottom are 'Cancel' and 'Create Public Project' buttons.

# Data Upload



# Data Upload

Face-Mask-Detection > Annotate

https://app.roboflow.com/studentprojects/face-mask-detection-s3ysd/annotate/job/wzcvYVsW6YC2ve91aUbc

roboflow Projects Universe Documentation Forum JongHyun Kim

Match-the-face-parts.

Uploaded on 07/11/22 at 9:48 pm

Add to Dataset X

STUDENTPROJECTS Face-Mask-Detection

Overview Unannotated 403 Annotated 0

403 Images  
Annotated 0  
Unannotated 403

Instructions Edit

No specific instructions were added when this job was assigned

Assignment Reassign

J JongHyun Kim Labeler

Timeline

J JongHyun Kim created this Job and assigned it to jhkim3217@gmail.com. 2022. 7. 11. 오후 9:57:45

Dataset 0

Generate

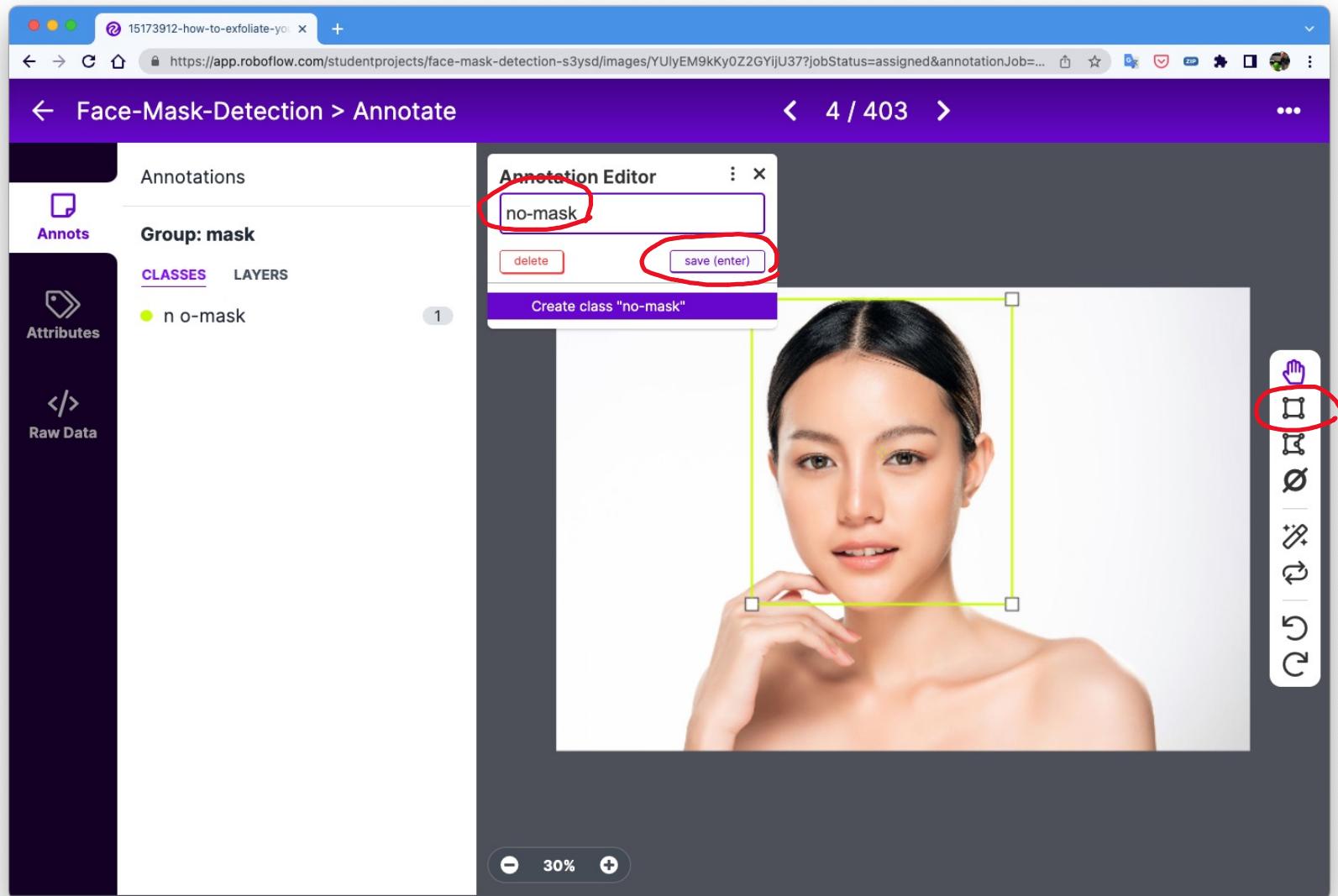
Versions

Health Check

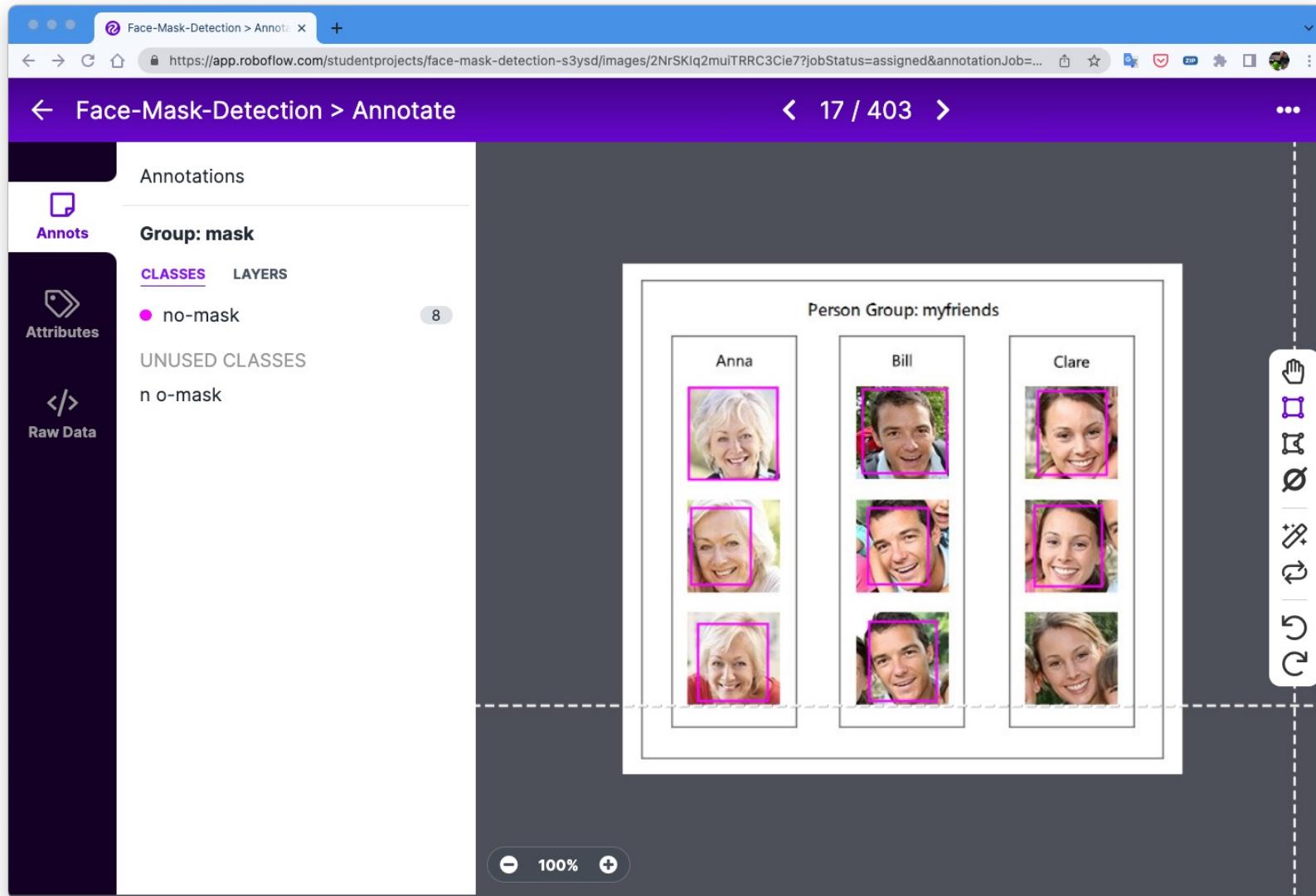
https://app.roboflow.com/studentprojects/face-mask-detection-s3ysd/images/QsPISfPG1gCwE9ni4NIU?jobStatus=assigned&annotationJob=wzcvYVsW6YC2ve91aUbc

The screenshot shows the Roboflow web application interface for a student project titled "Face-Mask-Detection". The main page displays an overview of the dataset, which consists of 403 images. All images are currently unannotated. The interface includes sections for instructions, assignment (assigned to JongHyun Kim), and a timeline showing the creation of the job. On the left, there's a sidebar with navigation links for Overview, Upload, Assign (beta), Annotate, Dataset (0), Generate, Versions, and Health Check. The URL in the browser bar is https://app.roboflow.com/studentprojects/face-mask-detection-s3ysd/annotate/job/wzcvYVsW6YC2ve91aUbc.

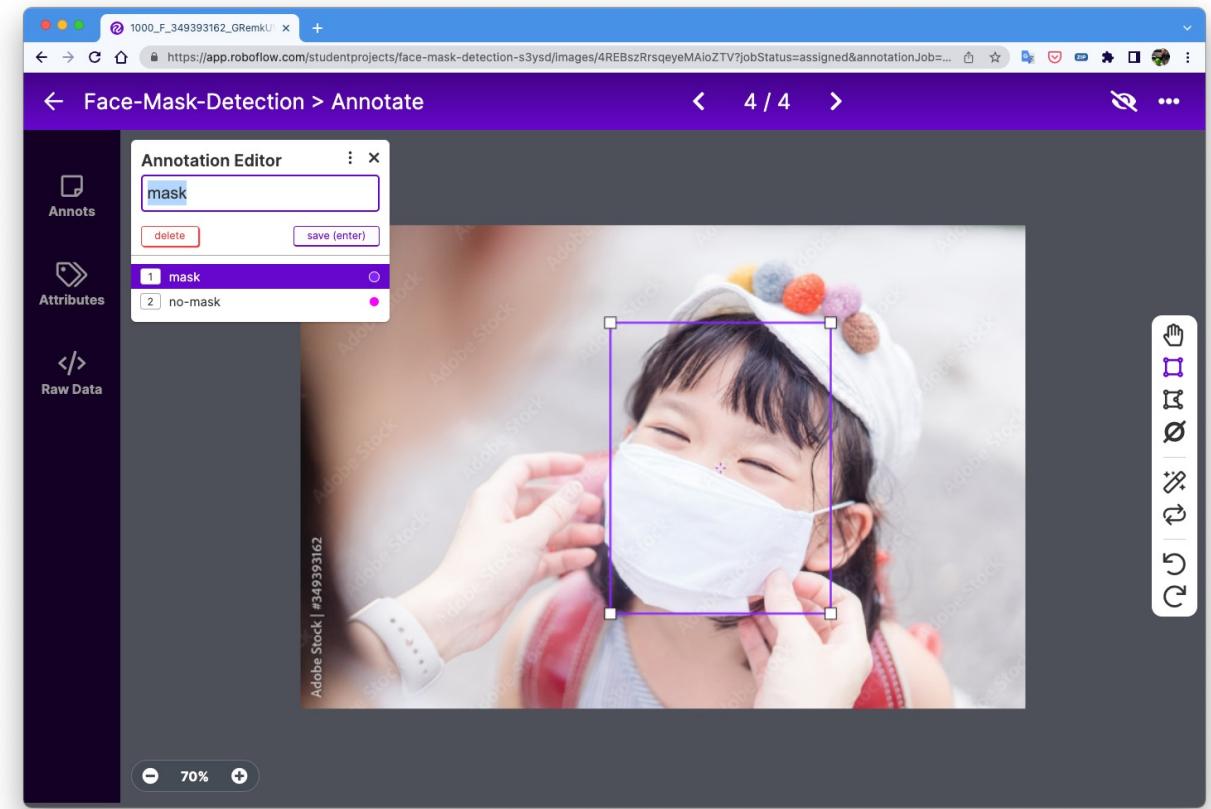
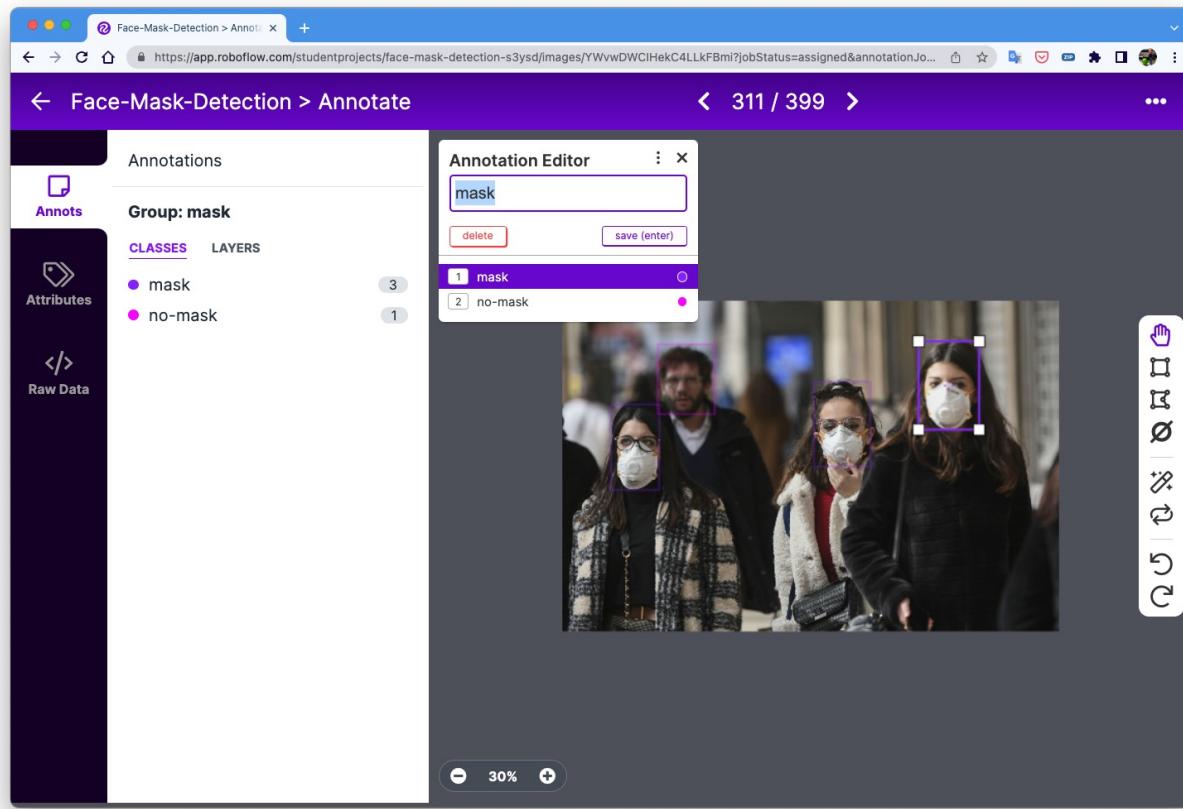
# Annotate : labeling & Bounding



# Annotate : labeling & Bounding



# Annotate : labeling & Bounding



# Annotate : labeling & Bounding

The screenshot shows the Roboflow Annotate interface. On the left, there are icons for eyes, nose, mouth, and ear, followed by a student project titled "Face-Mask-Detection". The main area has three sections: "UNASSIGNED", "ANNOTATING", and "DATASET". The "ANNOTATING" section is highlighted with a red circle and contains the following information:

- Uploaded on 07/11/22 at 9:48 pm
- 403 Images
  - Annotated 68
  - Unannotated 335
- J JongHyun Kim Labeler

The "DATASET" section on the right says "Approve annotated images to add them to your dataset".

The screenshot shows the Roboflow Annotate interface after the job has been completed. The "ANNOTATING" section from the previous screenshot now displays the following message:

Uploaded on 07/11/22 at 9:48 pm

The "DATASET" section on the right shows the status of the images:

- Unannotated 336
- Annotated 67

A green button labeled "Add 68 images to Dataset" is visible. The "ANNOTATING" section is circled in red.

The "DATASET" section also includes a timeline entry:

J JongHyun Kim created this Job and assigned it to jhkim3217@gmail.com. 2022. 7. 11. 오후 9:57:45

# Annotate : labeling & Bounding

The screenshot shows the Roboflow web interface for a student project titled "Face-Mask-Detection". The main dashboard on the left displays an overview of the dataset, including 403 images (68 annotated, 335 unannotated), instructions, assignments, and a timeline. A modal window titled "Add Images To Dataset" is open, prompting the user to add 68 images to the dataset. The "Method" is set to "Split Images Between Train/Valid/Test" with proportions of Train: 70%, Valid: 20%, and Test: 10%. Below this, the "Image Distribution" shows Train: 47 images, Valid: 13 images, and Test: 8 images. A note states that 335 images will be sent back as part of a new job. At the bottom of the modal is a prominent purple "Add Images" button, which is circled in red.

The screenshot shows the Roboflow web interface for the same "Face-Mask-Detection" project. The main dashboard on the left has a sidebar with "Dataset" (64 images) highlighted and circled in red. The central area shows three main sections: "UNASSIGNED" (Upload More Images), "ANNOTATING" (Job 2, 339 images, 0 annotated, 339 unannotated, assigned to JongHyun Kim), and "DATASET" (See all 64 images, 64 images, assigned to JongHyun Kim). A green "Generate New Version" button is visible in the top right corner.

# Dataset 생성

The screenshot shows the Roboflow web interface for a project titled "Face-Mask-Detection". On the left sidebar, there are icons for eyes, nose, mouth, and ear, followed by "STUDENTPROJECTS" and the project name "Face-Mask-Detection". Below these are links for "Overview", "Upload", "Assign", "Annotate", "Dataset" (with a "64" badge), "Generate", "Versions", and "Health Check". The main area is titled "Images" and displays a grid of 64 face images. At the top right of this section are buttons for "+ Add Images" and "Generate New Version >". A red circle highlights the "Generate New Version" button.

The screenshot shows the Roboflow web interface for generating a new version of the dataset. The top navigation bar includes "Projects", "Universe", "Documentation", "Forum", and "JongHyun Kim". The main content area is titled "Generating New Version" with the sub-instruction "Prepare your images and data for training by compiling them into a version. Experiment with different configurations to achieve better training results.". It lists "Source Images" (64 images, 2 classes, 0 unannotated) and "Train/Test Split" (Training Set: 44 images, Validation Set: 13 images, Testing Set: 7 images). A red circle highlights the "Preprocessing" section, which contains a list of transformations: "Auto-Orient" and "Resize (Stretch to 416x416)".

# 데이터 전처리, 증강

Preprocessing

Testing Set: 7 images

3 Preprocessing

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

Auto-Orient Edit

Resize Edit

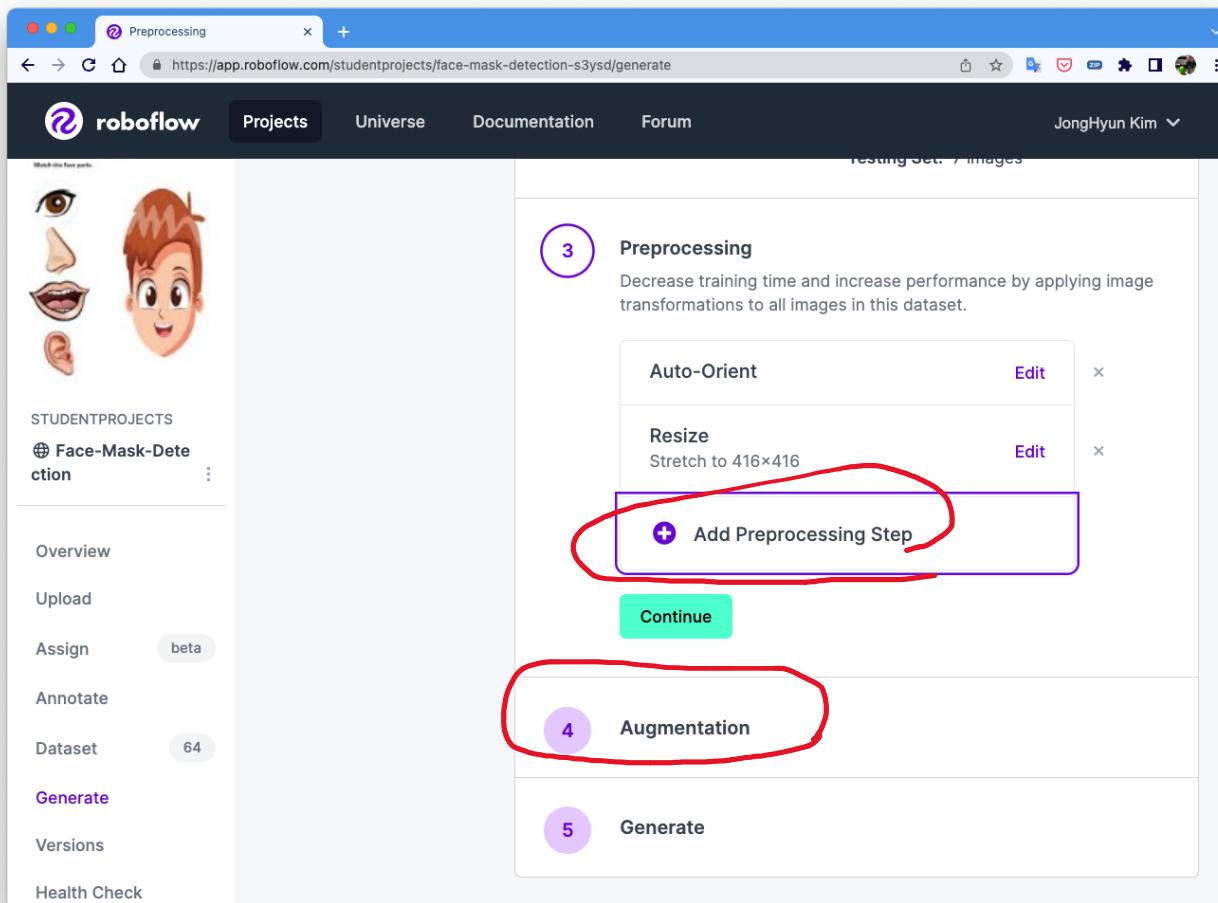
Stretch to 416x416

+ Add Preprocessing Step

Continue

4 Augmentation

5 Generate



Augmentation

Testing Set: 7 images

Set: 44 images  
On Set: 13 images  
Set: 7 images

44 images

Client: Applied

Stretch to 416x416

Augmentation Options

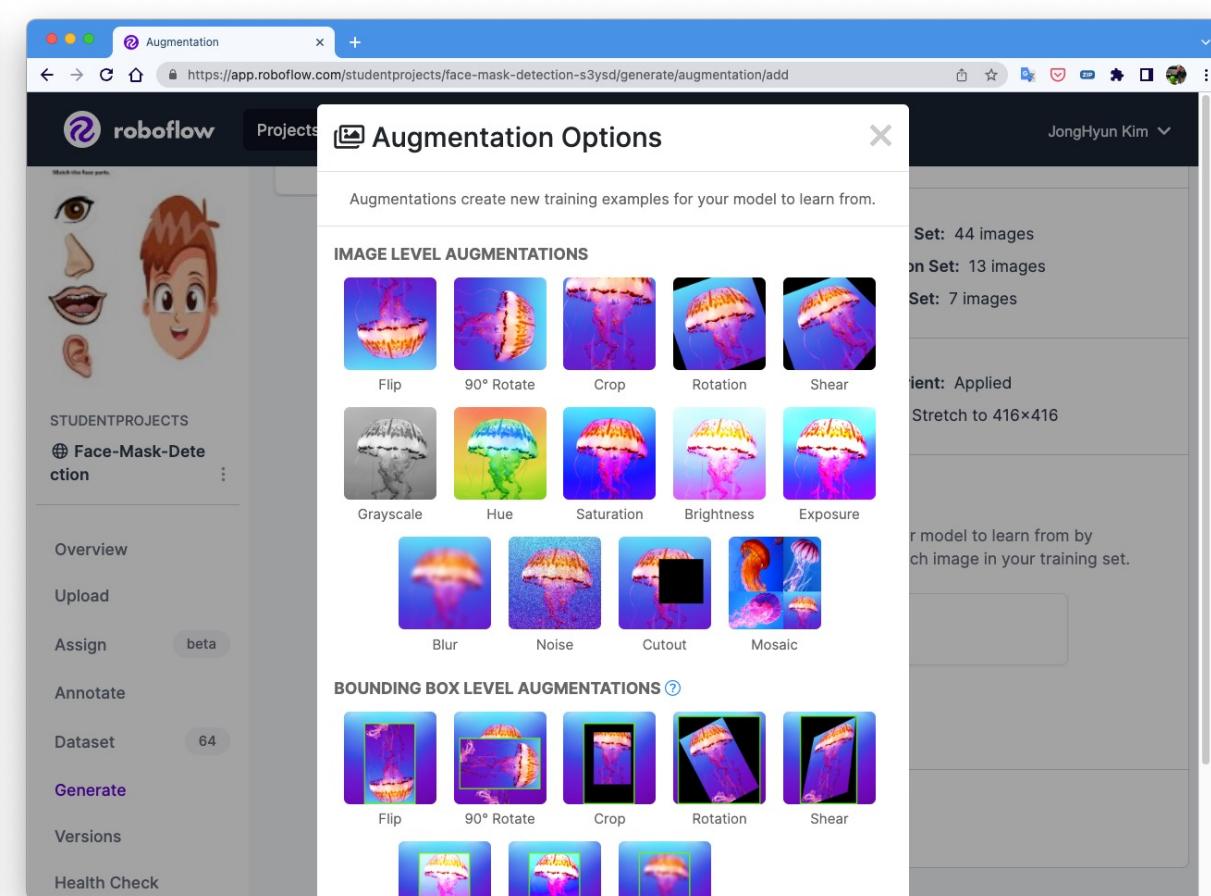
Augmentations create new training examples for your model to learn from.

IMAGE LEVEL AUGMENTATIONS

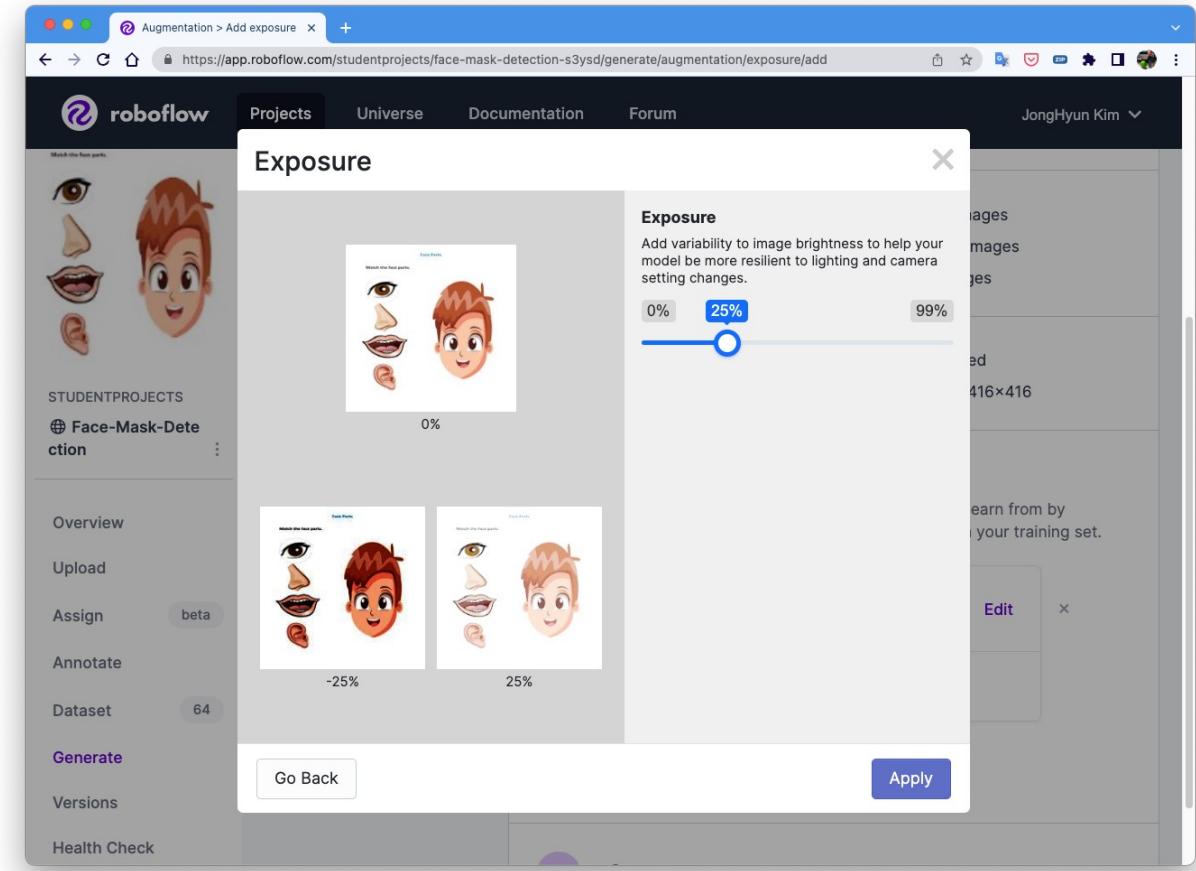
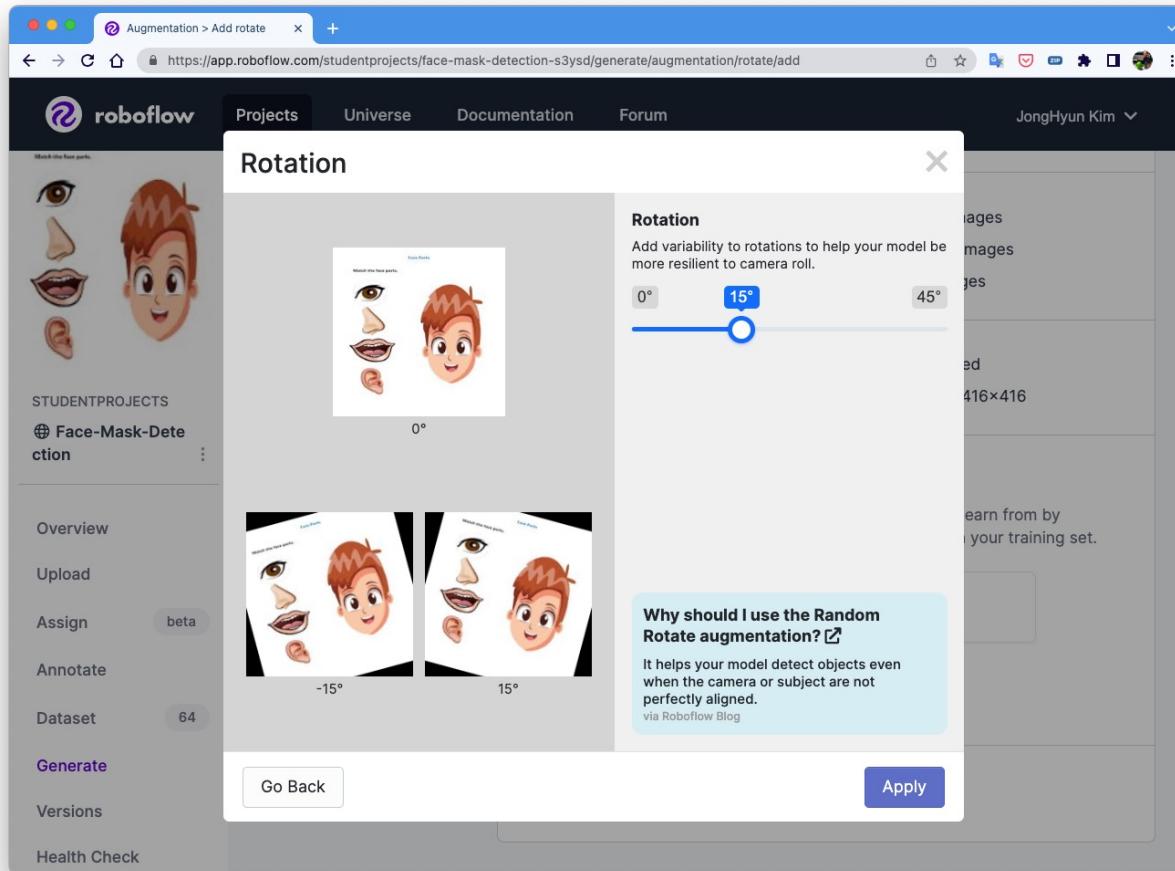
Flip	90° Rotate	Crop	Rotation	Shear

BOUNDING BOX LEVEL AUGMENTATIONS

Flip	90° Rotate	Crop	Rotation	Shear



# 데이터 전처리, 증강



# Generate : 데이터셋 생성

The screenshot shows the Roboflow Generate interface for a project titled "Face-Mask-Detection". On the left sidebar, there are sections for Overview, Upload, Assign, Annotate, Dataset (64 images), Generate (selected), Versions, and Health Check. The main area displays configuration options:

- Train/Test Split:** Training Set: 44 images, Validation Set: 13 images, Testing Set: 7 images.
- Preprocessing:** Auto-Orient: Applied, Resize: Stretch to 416x416.
- Augmentation:** Rotation: Between -15° and +15°, Exposure: Between -25% and +25%.
- Generate:** A step where the user reviews their selections and chooses a version size. A dropdown menu shows "152 images (3x)" and a red circle highlights the "Generate" button below it.

The screenshot shows the Roboflow Project page for the same "Face-Mask-Detection" project. The top bar includes links for Projects, Universe, Documentation, Forum, and the user's name, JongHyun Kim. The main content area includes:

- VERSIONS:** A section showing "New Version" created on "2022-07-11 10:53pm" (v1 Generated Jul 11, 2022). A red circle highlights the "Export" button in the top right of this section.
- TRAINING OPTIONS:** A section titled "Use Roboflow Train" with a note about training within 24 hours via API endpoint. It includes a "Start Training" button and "Available Credits: 3".
- IMAGES:** A grid of 152 images, with a "View All Images" link.
- TRAIN / TEST SPLIT:** A summary of the dataset distribution: Train (87%, 132 images), Valid (9%, 13 images), and Test (5%, 7 images).

# Export

The screenshot shows the Roboflow web interface for a "Face-Mask-Detection Dataset". A modal window titled "Export" is open, showing the "Format" dropdown set to "YOLO v5 PyTorch". The main interface displays the dataset's status: "152 images" and a "TRAIN / TEST SPLIT" of "Train 87%", "Valid 8%", and "Test 5%".

The screenshot shows the Roboflow web interface for the same dataset. A modal window titled "Your Download Code" is open, showing the "Jupyter" tab selected. It contains a code snippet for downloading the dataset using Roboflow's Python API:

```
!pip install roboflow
from roboflow import Roboflow
rf = Roboflow(api_key="REDACTED")
project = rf.workspace("studentprojects").project("face-mask-detection-s3y3d")
dataset = project.version(1).download("yolov5")
```

A red circle highlights this code block. A warning message below it states: "⚠ 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." The main interface shows "152 images" and a "Test" section with "7 images".