Could not connect to the reCAPTCHA service. Please check your internet connection and reload to get a reCAPTCHA challenge.

```
import os
os.environ['WANDB_MODE'] = 'disabled'
```

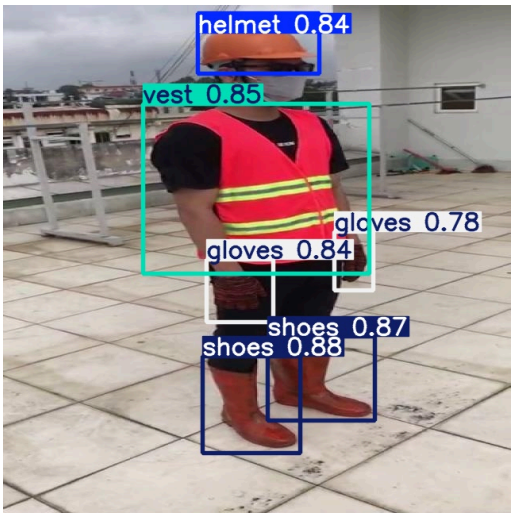
```
!git clone https://github.com/ultralytics/yolov5
%cd yolov5
```

```
Cloning into 'yolov5'...
remote: Enumerating objects: 17516, done.
remote: Counting objects: 100% (19/19), done.
remote: Compressing objects: 100% (19/19), done.
remote: Total 17516 (delta 6), reused 0 (delta 0), pa
Receiving objects: 100% (17516/17516), 16.66 MiB | 18
Resolving deltas: 100% (11997/11997), done.
/content/yolov5
```

```
!pip install -r requirements.txt
```

```
Requirement already satisfied: gitpython>=3.1.30 in
Requirement already satisfied: matplotlib>=3.3 in /
Requirement already satisfied: numpy>=1.23.5 in /us
Requirement already satisfied: opencv-python>=4.1.1
Requirement already satisfied: pillow>=10.3.0 in /u
Requirement already satisfied: psutil in /usr/local
Requirement already satisfied: PyYAML>=5.3.1 in /us
Requirement already satisfied: requests>=2.32.2 in
Requirement already satisfied: scipy>=1.4.1 in /usr
Collecting thop>=0.1.1 (from -r requirements.txt (l
  Downloading thop-0.1.1.post2209072238-py3-none-an
Requirement already satisfied: torch>=1.8.0 in /usr
Requirement already satisfied: torchvision>=0.9.0 i
Requirement already satisfied: tqdm>=4.66.3 in /usr
Collecting ultralytics>=8.2.64 (from -r requirement
  Downloading ultralytics-8.3.168-py3-none-any.whl.
Requirement already satisfied: pandas>=1.1.4 in /us
Requirement already satisfied: seaborn>=0.11.0 in /
Requirement already satisfied: setuptools>=70.0.0 i
Requirement already satisfied: gitdb<5,>=4.0.1 in /
Requirement already satisfied: contourpy>=1.0.1 in
Requirement already satisfied: cycler>=0.10 in /usr
Requirement already satisfied: fonttools>=4.22.0 in
Requirement already satisfied: kiwisolver>=1.3.1 in
Requirement already satisfied: packaging>=20.0 in /
Requirement already satisfied: pyparsing>=2.3.1 in
Requirement already satisfied: python-dateutil>=2.7
Requirement already satisfied: charset-normalizer<4
Requirement already satisfied: idna<4,>=2.5 in /usr
Requirement already satisfied: urllib3<3,>=1.21.1 i
```

image1076_jpg.rf.18de2251be9b8c •••



```
Requirement already satisfied: certifi>=2017.4.17 i
Requirement already satisfied: filelock in /usr/loc
Requirement already satisfied: typing-extensions>=4
Requirement already satisfied: networkx in /usr/loc
Requirement already satisfied: jinja2 in /usr/local
Requirement already satisfied: fsspec in /usr/local
Collecting nvidia-cuda-nvrtc-cu12==12.4.127 (from t
  Downloading nvidia_cuda_nvrtc_cu12-12.4.127-py3-n
Collecting nvidia-cuda-runtime-cu12==12.4.127 (from
  Downloading nvidia_cuda_runtime_cu12-12.4.127-py3
Collecting nvidia-cuda-cupti-cu12==12.4.127 (from t
  Downloading nvidia_cuda_cupti_cu12-12.4.127-py3-n
Collecting nvidia-cudnn-cu12==9.1.0.70 (from torch>
  Downloading nvidia_cudnn_cu12-9.1.0.70-py3-none-m
Collecting nvidia-cublas-cu12==12.4.5.8 (from torch
  Downloading nvidia_cublas_cu12-12.4.5.8-py3-none-
Collecting nvidia-cufft-cu12==11.2.1.3 (from torch>
  Downloading nvidia_cufft_cu12-11.2.1.3-py3-none-m
Collecting nvidia-curand-cu12==10.3.5.147 (from tor
  Downloading nvidia_curand_cu12-10.3.5.147-py3-non
Collecting nvidia-cusolver-cu12==11.6.1.9 (from tor
  Downloading nvidia_cusolver_cu12-11.6.1.9-py3-non
Collecting nvidia-cusparse-cu12==12.3.1.170 (from t
  Downloading nvidia_cusparse_cu12-12.3.1.170-py3-n
Requirement already satisfied: nvidia-cusparselt-cu
Requirement already satisfied: nvidia-nccl-cu12==2.
Requirement already satisfied: nvidia-nvtx-cu12==12
```

```
!unzip /PPE.v1i.yolov5pytorch.zip -d /content/
```

```
inflating: /content/valid/labels/image705_jpg.rf.
inflating: /content/valid/labels/image709_jpg.rf.
inflating: /content/valid/labels/image719_jpg.rf.
inflating: /content/valid/labels/image742_jpeg.rf
inflating: /content/valid/labels/image749_jpg.rf.
inflating: /content/valid/labels/image74_jpeg.rf.
inflating: /content/valid/labels/image759_jpg.rf.
inflating: /content/valid/labels/image762_jpg.rf.
inflating: /content/valid/labels/image763_jpg.rf.
inflating: /content/valid/labels/image767_jpg.rf.
inflating: /content/valid/labels/image771_jpg.rf.
inflating: /content/valid/labels/image798_jpg.rf.
inflating: /content/valid/labels/image804_jpg.rf.
inflating: /content/valid/labels/image808_jpg.rf.
inflating: /content/valid/labels/image824_jpg.rf.
inflating: /content/valid/labels/image826_jpg.rf.
inflating: /content/valid/labels/image852_jpeg.rf
inflating: /content/valid/labels/image867_jpg.rf.
inflating: /content/valid/labels/image868_jpg.rf.
inflating: /content/valid/labels/image876_jpg.rf.
inflating: /content/valid/labels/image885_jpg.rf.
inflating: /content/valid/labels/image896_jpg.rf.
inflating: /content/valid/labels/image897_jpeg.rf
inflating: /content/valid/labels/image933_jpg.rf.
inflating: /content/valid/labels/image942_jpg.rf.
inflating: /content/valid/labels/image955_jpg.rf.
inflating: /content/valid/labels/image961_jpeg.rf
inflating: /content/valid/labels/image981_jpeg.rf
inflating: /content/valid/labels/image989_jpg.rf.
inflating: /content/valid/labels/image997_jpg.rf.
inflating: /content/valid/labels/image9_jpg.rf.14
```

```
import zipfile
import os

zip_path = "/PPE.v1i.yolov5pytorch.zip"
extract_path = "/content/PPE1"

with zipfile.ZipFile(zip_path, 'r') as zip_ref:
    zip_ref.extractall(extract_path)

os.listdir(extract_path)
```

```
['train',
 'valid',
 'README.dataset.txt',
 'README.roboflow.txt',
 'data.yaml',
 'test']
```

```
label_dir = "/content/PPE1/train/labels"
print("Sample label file content:")
with open(os.path.join(label_dir, os.listdir(label_dir)[0
```

```
    print(f.read())
```

```
Sample label file content:
0 0.425 0.1453125 0.21875 0.0890625
4 0.54453125 0.6890625 0.1765625 0.13125
4 0.4875 0.7390625 0.225 0.1734375
3 0.45703125 0.3734375 0.290625 0.28125
7 0.4625 0.44765625 0.4765625 0.8171875
```

```
import os

# Update path to your unzipped dataset
dataset_dir = "/content/PPE1"
label_dirs = ["train", "valid","test"]  # Modify if you h

# Mapping from original to new class IDs
class_map = {
    0: 0,  # face
    2: 1,  # mask
    1: 2,  # helmet
    3: 3,  #vest
    4: 4   # shoes
}

for split in label_dirs:
    label_path = os.path.join(dataset_dir, split,"labels"
    for file in os.listdir(label_path):
        if file.endswith(".txt"):
            new_lines = []
            file_path = os.path.join(label_path, file)
            with open(file_path, "r") as f:
                for line in f:
                    parts = line.strip().split()
                    class_id = int(parts[0])
                    if class_id in class_map:
                        parts[0] = str(class_map[class_id
                        new_lines.append(" ".join(parts))
            with open(file_path, "w") as f:
                f.write("\n".join(new_lines))


label_dir = "/content/PPE1/train/labels"
print("Sample label file content:")
with open(os.path.join(label_dir, os.listdir(label_dir)[0
    print(f.read())
```

```
Sample label file content:
0 0.425 0.1453125 0.21875 0.0890625
4 0.54453125 0.6890625 0.1765625 0.13125
4 0.4875 0.7390625 0.225 0.1734375
3 0.45703125 0.3734375 0.290625 0.28125
```

```
error_files = []
label_dir = "/content/PPE1/train/labels"
for file in os.listdir(label_dir):
    with open(os.path.join(label_dir, file), 'r') as f:
        lines = f.readlines()
        for line in lines:
            class_idx = int(line.split()[0])
            if class_idx > 4:
                error_files.append((file, class_idx))
                # removed break here to find all errors i
if error_files:
    print("⚠️ Files with out-of-range class indices:")
    print(error_files)
else:
    print("✅ All label files use correct class indices
```

```
✅ All label files use correct class indices (0-4).
```

```
import yaml

data_yaml_path = "/content/PPE1/data.yaml"

with open(data_yaml_path, 'r') as f:
    data_yaml = yaml.safe_load(f)

# Update paths to absolute paths within /content/PPE1
data_yaml['train'] = '/content/PPE1/train/images'
data_yaml['val'] = '/content/PPE1/valid/images'
data_yaml['test'] = '/content/PPE1/test/images' # Add thi

# Correct the class name from 'face' to 'hand gloves'
# Based on the previous output of data.yaml, 'face' is at
if 'names' in data_yaml and len(data_yaml['names']) > 2:
    data_yaml['names'][2] = 'hand gloves'
else:
    print("Could not find or modify the 'names' list in d


with open(data_yaml_path, 'w') as f:
    yaml.dump(data_yaml, f)

print("Updated data.yaml:")
with open(data_yaml_path, 'r') as f:
    print(f.read())
```

```
Updated data.yaml:
names:
- helmet
- gloves
- hand gloves
```

```
- vest
- shoes
nc: 5
roboflow:
  license: CC BY 4.0
  project: ppe-nwha8
  url: https://universe.roboflow.com/imageprocessing-
  version: 1
  workspace: imageprocessing-cwtjn
test: /content/PPE1/test/images
train: /content/PPE1/train/images
val: /content/PPE1/valid/images
```

```
!python train.py --img 640 --batch 16 --epochs 50 --data
```

```
                 all        143        663      0

50 epochs completed in 0.377 hours.
Optimizer stripped from runs/train/PPE_detection_re
Optimizer stripped from runs/train/PPE_detection_re

Validating runs/train/PPE_detection_retrain/weights
Fusing layers...
YOLOv5s summary: 157 layers, 7023610 parameters, 0
                Class     Images  Instances
                  all        143        663      0
               helmet        143        201
                 face        143          4
               gloves        143        136      0
                 vest        143        171      0
                shoes        143        151      0
Results saved to runs/train/PPE_detection_retrain
wandb: WARNING ⚠️ wandb is deprecated and will be r
```

```
!python detect.py --weights /content/yolov5/runs/train/PPE_
```

```
detect: weights=['/content/yolov5/runs/train/PPE_dete
YOLOv5 🚀 v7.0-422-g2540fd4c Python-3.11.13 torch-2.

Fusing layers...
YOLOv5s summary: 157 layers, 7023610 parameters, 0 gr
image 1/1 /content/PPE1/test/images/image1076_jpg.rf.
Speed: 0.6ms pre-process, 11.5ms inference, 172.5ms N
Results saved to runs/detect/exp5
```