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Applied Ai Midterm

This project was completed using google colab. Since it was unable to be ran on 3 different local machines I have tried. You can review the issues in the “Issues running locally” section at the end.

The below picture shows how we install detectron and initialize it. Then we check the versions and set the paths.

Install detectron2

```
!python -m pip install pyyaml==5.1
import sys, os, distutils.core

!git clone 'https://github.com/facebookresearch/detectron2'
dist = distutils.core.run_setup("./detectron2/setup.py")
!python -m pip install {' '.join([f"'{x}'" for x in dist.install_requires])}
sys.path.insert(0, os.path.abspath('./detectron2'))
```

Show hidden output

```
[25] import torch, detectron2
     !nvcc --version
     TORCH_VERSION = ".".join(torch.__version__.split(".")[:2])
     CUDA_VERSION = torch.__version__.split("+")[-1]
     print("torch: ", TORCH_VERSION, "; cuda: ", CUDA_VERSION)
     print("detectron2:", detectron2.__version__)
```

```
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2021 NVIDIA Corporation
Built on Sun_Feb_14_21:12:58_PST_2021
Cuda compilation tools, release 11.2, V11.2.152
Build cuda_11.2.r11.2/compiler.29618528_0
torch:  1.12 ; cuda:  cu113
detectron2: 0.6
```

```python
# Some basic setup:
import detectron2
from detectron2.utils.logger import setup_logger
setup_logger()

# import some common libraries
import numpy as np
import os, json, cv2, random

# import some common detectron2 utilities
from detectron2 import model_zoo
from detectron2.engine import DefaultPredictor
from detectron2.config import get_cfg
from detectron2.utils.visualizer import Visualizer
from detectron2.data import MetadataCatalog, DatasetCatalog

# Extras
from IPython.display import Image

from google.colab import output

import matplotlib.pyplot as plt
%matplotlib inline

plt.figure(figsize=(10,10))

from IPython.display import display, Javascript
from google.colab.output import eval_js
from base64 import b64decode
```

```
<Figure size 720x720 with 0 Axes>
```

Above we import libraries to be use and set up matplotlib.

Java script function that will take a picture for us

```
[39] def take_photo(filename='photo.jpg', quality=0.8):
       js = Javascript('''
         async function takePhoto(quality) {
           const div = document.createElement('div');
           const capture = document.createElement('button');
           capture.textContent = 'Capture';
           div.appendChild(capture);

           const video = document.createElement('video');
           video.style.display = 'block';
           const stream = await navigator.mediaDevices.getUserMedia({video: true});

           document.body.appendChild(div);
           div.appendChild(video);
           video.srcObject = stream;
           await video.play();

           // Resize the output to fit the video element.
           google.colab.output.setIframeHeight(document.documentElement.scrollHeight, true);

           // Wait for Capture to be clicked.
           // await new Promise((resolve) => capture.onclick = resolve);

           const canvas = document.createElement('canvas');
           canvas.width = video.videoWidth;
           canvas.height = video.videoHeight;
           canvas.getContext('2d').drawImage(video, 0, 0);
           stream.getVideoTracks()[0].stop();
           div.remove();
           return canvas.toDataURL('image/jpeg', quality);
         }
         ''')
       display(js)
       data = eval_js('takePhoto({})'.format(quality))
       binary = b64decode(data.split(',')[1])
       with open(filename, 'wb') as f:
         f.write(binary)
       return filename
```

We must use a Java script to allow us to stream our webcam to google colab and take a picture.

Function to take a photo and save it then run the masking/keypoints/panoptic_seg

+ Code + Text

```
[57] def take_pic():
       filename = take_photo()
       print('Saved to {}'.format(filename))


       im = cv2.imread("./photo.jpg")
       im = cv2.cvtColor(im, cv2.COLOR_BGR2RGB)
       return im
     def mask_rcnn(im):
       # Mask RCNN
       cfg = get_cfg()
       cfg.merge_from_file(model_zoo.get_config_file("COCO-InstanceSegmentation/mask_rcnn_R_50_FPN_3x.yaml"))
       cfg.MODEL.ROI_HEADS.SCORE_THRESH_TEST = 0.8  # set threshold for this model
       cfg.MODEL.WEIGHTS = model_zoo.get_checkpoint_url("COCO-InstanceSegmentation/mask_rcnn_R_50_FPN_3x.yaml")

       predictor = DefaultPredictor(cfg)

       outputs = predictor(im)
       output.clear()

       v = Visualizer(im[:, :, ::-1], MetadataCatalog.get(cfg.DATASETS.TRAIN[0]), scale=0.8) # 1.2

       out = v.draw_instance_predictions(outputs["instances"].to("cpu"))
       plt.imshow(out.get_image()[:, :, ::-1])
       plt.show()
```

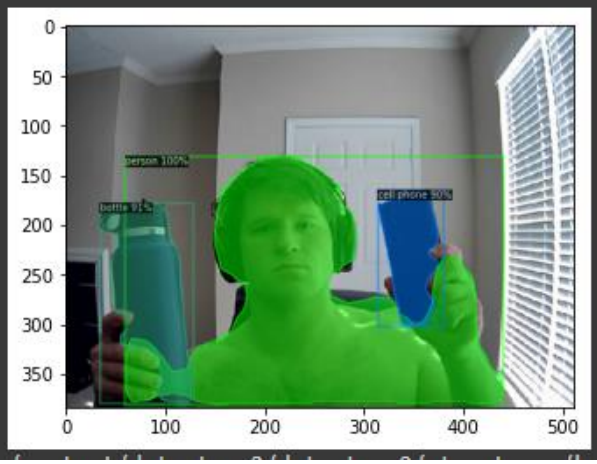
Here is where the definitions are for our picture function which will use the java function. This saves the file in jpg format then converts it to RGB format for use in plotting.

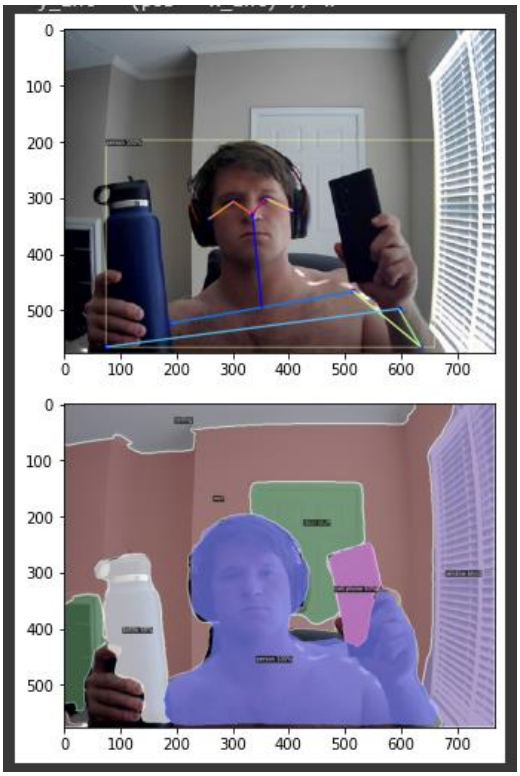
We also have our Mask RCNN function which does all the masking of the image taken and predictions.

This also plots the function on a graph.

Run the function once

```
[62] im = take_pic()
     mask_rcnn(im)
     keypoints(im)
     panoptic_seg(im)
```

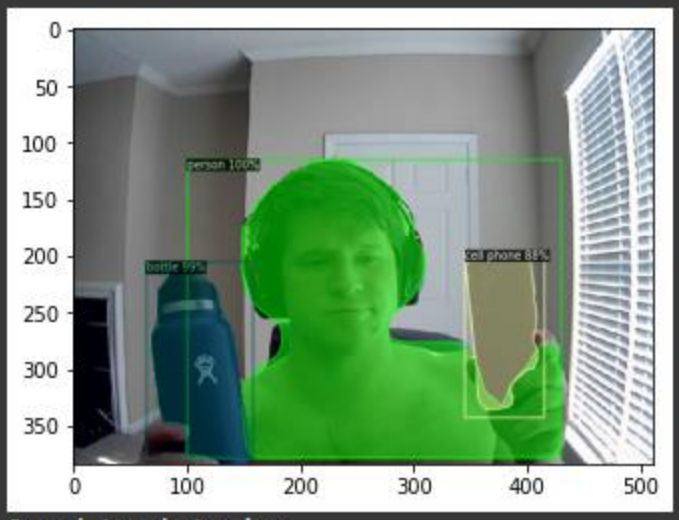




Above is running the functions one time and the results.

Run the function infinitly to simulate real time.

```
[66] while(True):
       im = take_pic()
       mask_rcnn(im)
       # keypoints(im)
       # panoptic_seg(im)
```




```
Saved to photo.jpg
```

Now we run the function in a loop to help simulate running this real-time. Google colab runs to slow to get a real-time implementation working.

Issues running locally:

```
import torch, detectron2
!nvcc --version
TORCH_VERSION = ".".join(torch.__version__.split(".")[:2])
CUDA_VERSION = torch.__version__.split("+")[-1]
print("torch: ", TORCH_VERSION, "; cuda: ", CUDA_VERSION)
print("detectron2:", detectron2.__version__)
```

```
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2022 NVIDIA Corporation
Built on Wed_Jun__8_16:59:34_Pacific_Daylight_Time_2022
Cuda compilation tools, release 11.7, V11.7.99
Build cuda_11.7.r11.7/compiler.31442593_0
torch:  1.13 ; cuda:  1.13.0
```

```
---------------------------------------------------------------------------
AttributeError                            Traceback (most recent call last)
c:\Applied-Artificial-Intelligence-ECGR-6119-001\midterm.ipynb Cell 4 in <cell line: 6>()
      4 CUDA_VERSION = torch.__version__.split("+")[-1]
      5 print("torch: ", TORCH_VERSION, "; cuda: ", CUDA_VERSION)
----> 6 print("detectron2:", detectron2.__version__)

AttributeError: module 'detectron2' has no attribute '__version__'
```

```
import torch, detectron2
!nvcc --version
TORCH_VERSION = ".".join(torch.__version__.split(".")[:2])
CUDA_VERSION = torch.__version__.split("+")[-1]
print("torch: ", TORCH_VERSION, "; cuda: ", CUDA_VERSION)
print("detectron2:", detectron2.__version__)
```

✓ 1.1s

```
nvcc: NVIDIA (R) Cuda compiler driver
Copyright (c) 2005-2022 NVIDIA Corporation
Built on Wed_Jun__8_16:59:34_Pacific_Daylight_Time_2022
Cuda compilation tools, release 11.7, V11.7.99
Build cuda_11.7.r11.7/compiler.31442593_0
torch:  1.13 ; cuda:  1.13.0
detectron2: 0.6
```

```
1.4s

Output exceeds the size limit. Open the full output data in a text editor
---------------------------------------------------------------------------
AssertionError                            Traceback (most recent call last)
c:\Applied-Artificial-Intelligence-ECGR-6119-001\midterm.ipynb Cell 7 in <cell line: 7>()
      5 # Find a model from detectron2's model zoo. You can use the https://dl.fbaipublicfiles... url as well
      6 cfg.MODEL.WEIGHTS = model_zoo.get_checkpoint_url("COCO-InstanceSegmentation/mask_rcnn_R_50_FPN_3x.yaml")
----> 7 predictor = DefaultPredictor(cfg)
      8 outputs = predictor(frame)

File c:\Applied-Artificial-Intelligence-ECGR-6119-001\detectron2\detectron2\engine\defaults.py:282, in DefaultPredictor.__init__(self, cfg)
    280 def __init__(self, cfg):
    281     self.cfg = cfg.clone()  # cfg can be modified by model
--> 282     self.model = build_model(self.cfg)
    283     self.model.eval()
    284     if len(cfg.DATASETS.TEST):

File c:\Applied-Artificial-Intelligence-ECGR-6119-001\detectron2\detectron2\modeling\meta_arch\build.py:23, in build_model(cfg)
     21 meta_arch = cfg.MODEL.META_ARCHITECTURE
     22 model = META_ARCH_REGISTRY.get(meta_arch)(cfg)
---> 23 model.to(torch.device(cfg.MODEL.DEVICE))
     24 _log_api_usage("modeling.meta_arch." + meta_arch)
     25 return model

File c:\Users\Johnny\anaconda3\envs\midterm_detectron\lib\site-packages\torch\nn\modules\module.py:987, in Module.to(self, *args, **kwargs)
    983         return t.to(device, dtype if t.is_floating_point() or t.is_complex() else None,
    984                     non_blocking, memory_format=convert_to_format)

...
    222 if _cudart is None:
    223     raise AssertionError(
    224         "libcudart functions unavailable. It looks like you have a broken build?")

AssertionError: Torch not compiled with CUDA enabled
```

+ Code + Markdown