

Build a dataset of hands playing the piano

Oct 4th, 2023

To, professor

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2. How to build experiment environment
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1. Hands keypoint annotation tools

Pseudo Labeling 결과가 COCO Format이면 p.1~p.6에 소개하는 Annotation Tool을 활용하여 reannotation이 가능할 것 같습니다.

1. Hands Keypoint labeling tools

| 번호 | 이름 | 설명 | 비용 |
|----|---|--|--|
| 1 | Label Studio https://labelstud.io/ | 오픈소스 타입의 labeling tool(django 기반, 로컬 환경에 설치 후 사용) Keypoint Labeling 기능 제공, 그러나 pseudo labeling으로 나온 value를 활용 여부는 unknown(test 필요) 자체 제공하는 json 형식으로만 저장 / 다른 형식 사용 불가 | 무료 |
| 2 | CVAT (Computer Vision Annotation Tool) | OpenCV에서 제공(https://github.com/opencv/cvat) docker를 통해 로컬 환경에 설치 후 사용 Keypoint Labeling 기능 제공, COCO 형식으로 데이터셋 내보내기 가능 사용 방법: https://www.youtube.com/watch?v=kOIEC3OhK7o | 무료 |
| 3 | V7 Labs | 간단한 클릭과 드래그로 키포인트에 주석을 달 수 있는 웹 기반 주석 도구 COCO 형식으로 내보내기 가능 참고 자료: https://www.v7labs.com/blog/keypoint-annotation-guide | 데모 사용 이후 유료 월 150\$ |
| 4 | Annotation Tools | 5년 전 마지막 업데이트, COCO 형식으로 데이터셋 내보내기 가능 GitHub: https://github.com/visipedia/annotation_tools | 무료 |
| 5 | Supervisely | labeling 작업 후 YOLOv8를 통해 자동 감지 + ViTPose를 사용하여 자동 라벨링 COCO 형식으로 데이터셋 내보내기 가능 참고 자료: https://supervisely.com/blog/animal-pose-estimation/ | 하루에 100개 무료 라벨링 가능, 기업용은 30일 무료 평가판 사용 가능 |

1_1. Label Studio



Input preview

```
{  
  "img": "https://app.heartex.ai/static/samples/sample.jpg"  
}
```

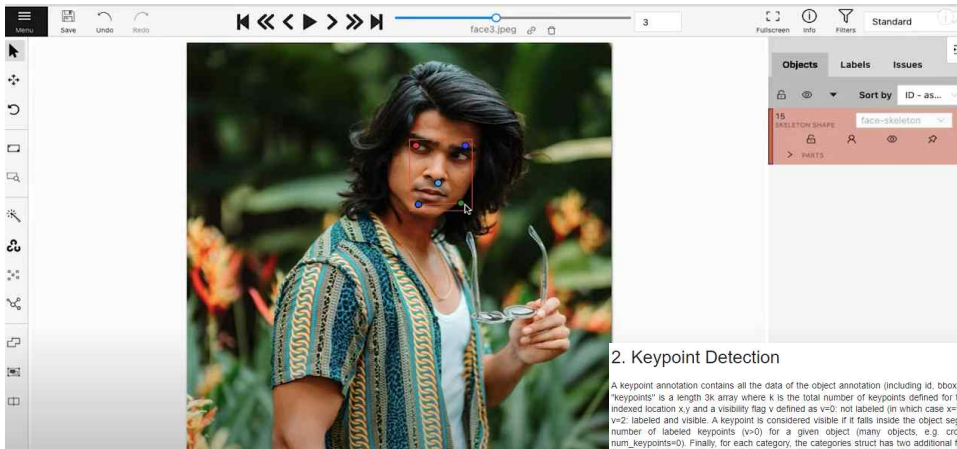
Parameters

| Param | Type | Default | Description |
|---------------|--------------|-----------|--|
| name | string | | Name of the element |
| toName | string | | Name of the image to label |
| [opacity] | float | 0.9 | Opacity of keypoint |
| [fillColor] | string | "#8bad00" | Keypoint fill color in hexadecimal |
| [strokeWidth] | number | 1 | Width of the stroke |
| [strokeColor] | string | "#8bad00" | Keypoint stroke color in hexadecimal |
| [smart] | boolean | | Show smart tool for interactive pre-annotations |
| [smartOnly] | boolean | | Only show smart tool for interactive pre-annotations |
| [snap] | pixel none | none | Snap keypoint to image pixels |

Output preview

```
{  
  {  
    "original_width": 600,  
    "original_height": 403,  
    "image_rotation": 0,  
    "value": {  
      "x": 56.333333333333336,  
      "y": 56.82382133995037,  
      "width": 0.16666666666666666,  
      "keypoint_labels": [  
        "Face"  
      ]  
    },  
    "id": "e-8Hiv&kiU",  
    "from_name": "kp-1",  
    "to_name": "img-1",  
    "type": "keypoint_labels"  
  }  
}
```

1_2. CVAT



2. Keypoint Detection

A keypoint annotation contains all the data of the object annotation (including id, bbox, etc.) and two additional fields. First, "keypoints" is a length 3k array where k is the total number of keypoints defined for the category. Each keypoint has a 0-indexed location x,y and a visibility flag v defined as v=0: not labeled (in which case x=y=0), v=1: labeled but not visible, and v=2: labeled and visible. A keypoint is considered visible if it falls inside the object segment. "num_keypoints" indicates the number of labeled keypoints (v=0) for a given object (many objects, e.g. crowds and small objects, will have num_keypoints=0). Finally, for each category, the categories struct has two additional fields: "keypoints", which is a length k array of keypoint names, and "skeleton", which defines connectivity via a list of keypoint edge pairs and is used for visualization. Currently keypoints are only labeled for the person category (for most medium/large non-crowd person instances). See also the [keypoint task](#).

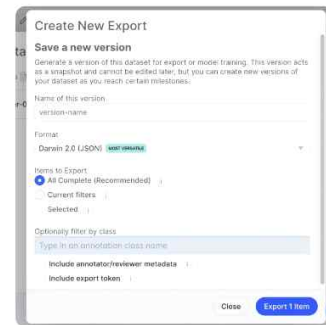
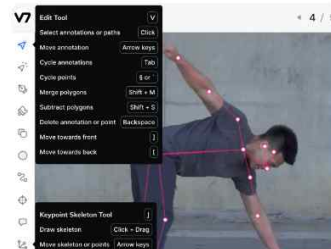
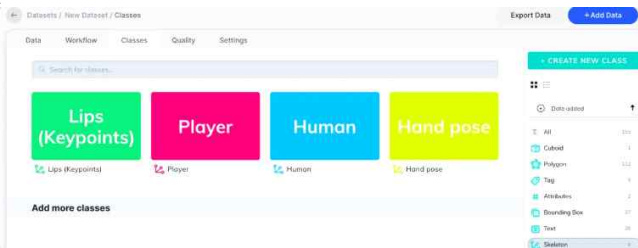
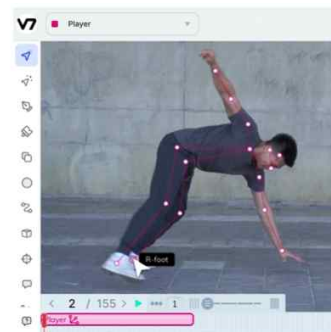
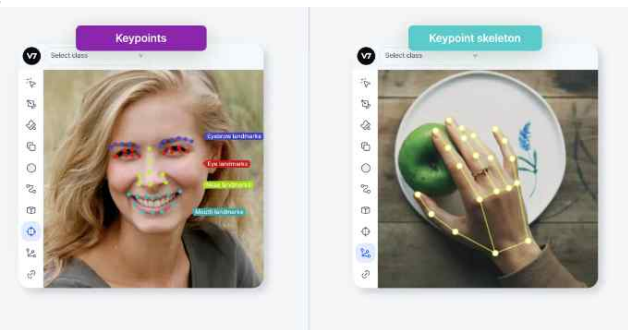
```
annotation{
  "keypoints"      : [x1,y1,v1,...],
  "num_keypoints"  : int,
  "[cloned]"       : ...,
}

categories[{
  "keypoints"      : [str],
  "skeleton"       : [edge],
  "[cloned]"       : ...,
}]
```

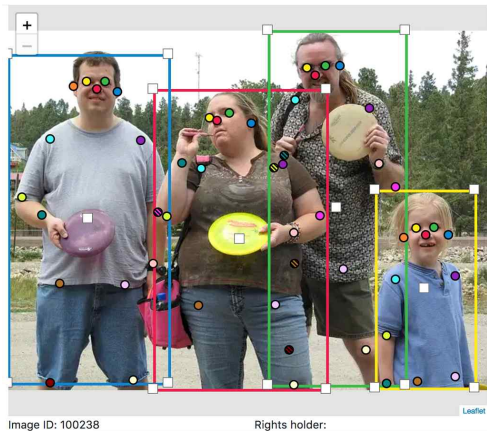
"[cloned]": denotes fields copied from object detection annotations defined above.

```
{
  "licenses":
  [
    {
      "name": "",
      "id": 0,
      "url": ""
    }
  ],
  "info":
  {
    "contributor": "",
    "date_created": "",
    "description": "",
    "url": "",
    "version": "",
    "year": ""
  },
  "categories":
  [
    {
      "id": 1,
      "name": "face-keypoints",
      "supercategory": "",
      "keypoints":
      [
        "1",
        "2",
        "3",
        "4",
        "5"
      ],
      "skeleton":
      [
        [
          1,
          2
        ],
        [
          2,
          3
        ],
        [
          3,
          4
        ],
        [
          4,
          5
        ]
      ]
    },
    {
      "id": 2,
      "name": "face-skeleton",
      "supercategory": "",
      "keypoints":
      [
        "1",
        "2",
        "3",
        "4",
        "5"
      ],
      "skeleton":
      [
        [
          1,
          2
        ],
        [
          2,
          3
        ],
        [
          3,
          4
        ],
        [
          4,
          5
        ]
      ]
    }
  ]
}
```

1_3. V7 Labs



1_4. Annotation Tools



| New | | Hide All | Show All | Save | |
|--|-------|----------|--------------|-------------|--------|
| <input checked="" type="checkbox"/> person | 4 N/A | Focus | Annotate N/A | Hide Others | Delete |
| <input checked="" type="checkbox"/> person | 3 N/A | Focus | Annotate N/A | Hide Others | Delete |
| <input checked="" type="checkbox"/> person | 6 N/A | Focus | Annotate N/A | Hide Others | Delete |
| <input checked="" type="checkbox"/> person | 2 N/A | Focus | Annotate N/A | Hide Others | Delete |

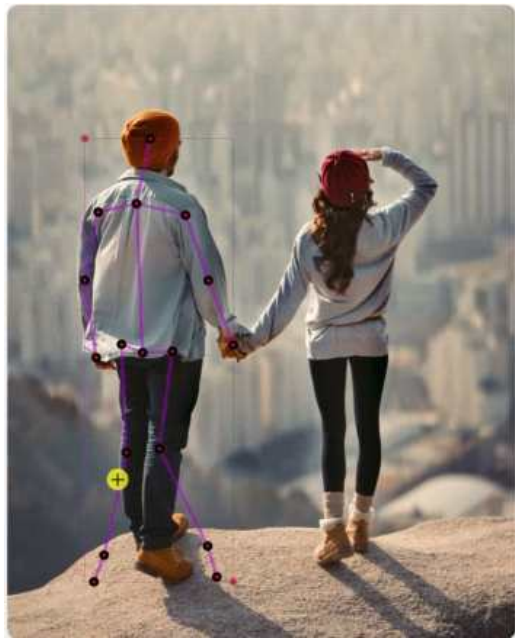
Free edit

Edit any annotations that need adjustment. Use the drag handles to modify boxes. Drag the markers to modify points. Use the visibility checkboxes to modify whether a component is visible or not.

Prev Next Image 2 / 100

```
annotation{
  "id" : str,
  "image_id" : str,
  "category_id" : str,
  "segmentation" : RLE or [polygon],
  "area" : float,
  "bbox" : [x,y,width,height],
  "iscrowd" : 0 or 1,
  "keypoints" : [x, y, v, ...],
  "num_keypoints" : int
}
```


1_5. Supervisely



🌟 AI 스마트툴

□ 경계 상자

○ 다각형

🖌 브러시 비트맵

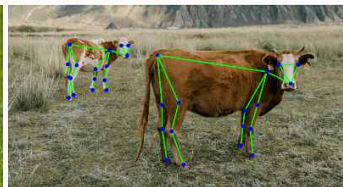
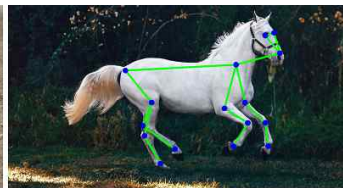
👁 펜 마스크

👤 키 포인트

🕒 포인트들

📐 폴리라인

📁 큐비오드



| 2. How to build experiment environment

To be added