Deep High-Resolution Representation Learning for Human Pose Estimation

COMP8240 Progress Update Presentation - Group G

David Dela Cruz
Rigel Ng
Srikar Parimi
Shreyas Kumar Singh

Macquarie University

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Outline

Research Overview

- Deep High-Resolution Representation Learning for Human Pose Estimation
- Human Pose Estimation Problem
  - High-Resolution Deep Neural Network (HRNet)
  - Top-Down: Human Detection - Single Person Keypoint Detection
    - ★ Input: Person Bounding Boxes, Images
    - ★ Output: Keypoint Coordinates
  - Human Keypoint Estimation
    - ★ Nose, Eyes, Ears, Shoulders, Elbows, Wrists, Hips, Knees & Ankles

Progress since initial presentation - 12-10-2021

- Set up Google-Colab environment to reproduce results
- Replicated all Key-Point Detection results as described in the original paper
- Use DataTorch to create Dataset that aligns with the CoCo dataset
- Tested a small-sample of the generated dataset to verify whether end-to-end pipeline works
- Currently building a dataset of more than 100 hand-annotated key point images.

Specifications

- Environment: Google Colab
- Requirements:
  - Python
  - COCOAPI
  - Pytorch
- Issues Encountered:
  - GPU Limitation
    - ★ Update python test scripts accordingly
    - ★ Longer execution time for Keypoint estimation

Replication of Original Dataset

2017 COCO Dataset

- Consists of 200k Training Images and 5000 Validation Images, 20000 Test Set Images
  - Keypoint Annotations - JSON Format
- Dataset is publicly available and can be accessed through https://cocodataset.org/home
- FiftyOne
  - open-source tool facilitating visualization and access to COCO data resources.

Replication of Results (COCO 2017 Validation Set)

Original Results

Model	AP	AP^{50}	AP^{75}	AP^{M}	AP^{L}	AR
HRNet-W32	75.8	90.6	82.7	71.9	82.8	81.0
HRNet-W48	76.3	90.8	82.9	72.3	83.4	81.2

Replicated Results

Model	AP	AP^{50}	AP^{75}	AP^{M}	AP^{L}	AR
HRNet-W32	75.8	90.6	82.5	72.0	82.7	80.9
HRNet-W48	76.3	90.8	82.9	72.3	83.4	81.2

Creation of New Dataset

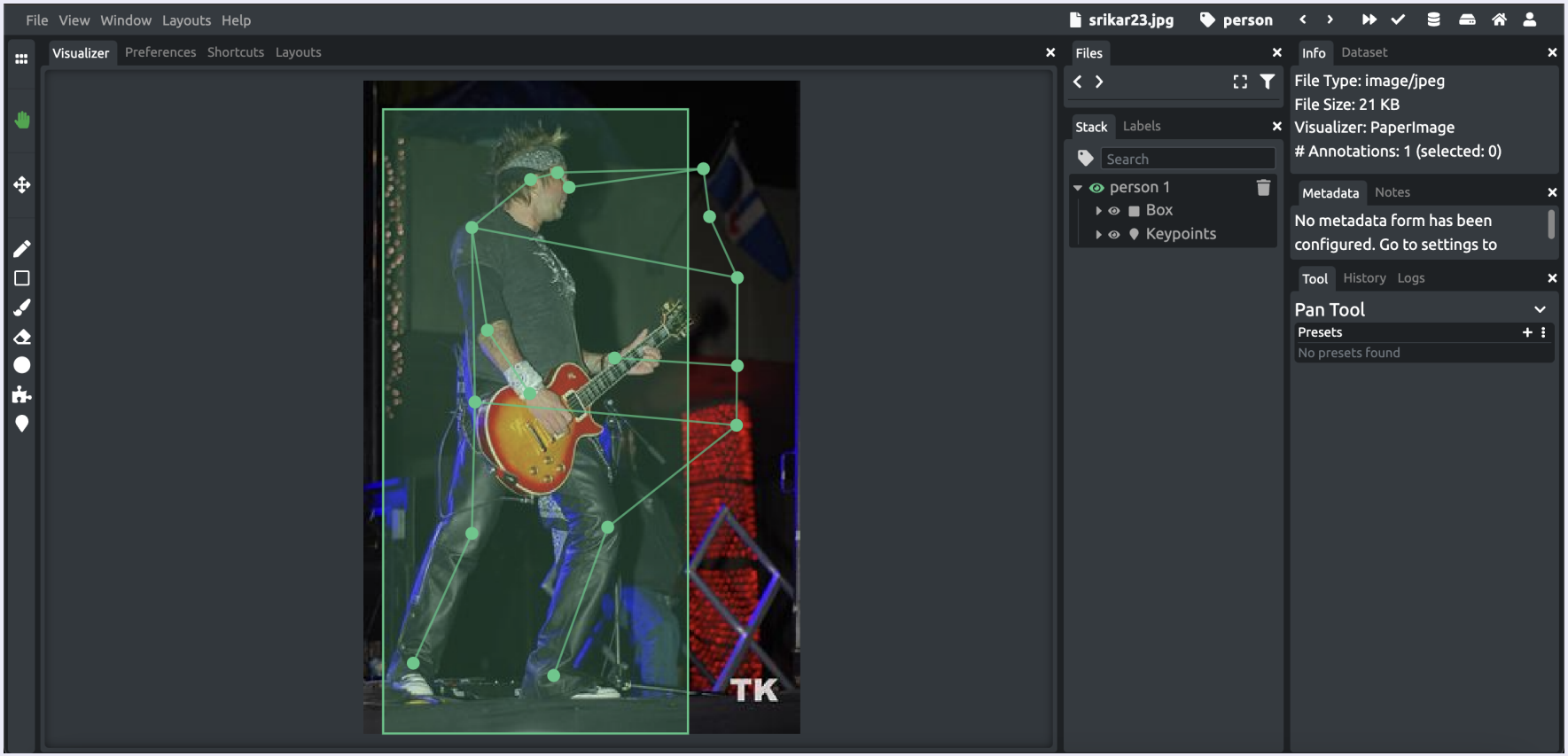
DataTorch.io

- An Open-Source platform to build different types of machine-learning datasets.
- Export Person Bounding Box & Keypoint Annotations in a JSON file in the similar format of the Original COCO Dataset.
- We have created a python script to re-format and clean the DataTorch JSON file

Creation of New Dataset

DataTorch.io

- Obtain 100 images from various sources and manually annotate Person Bounding Boxes & Keypoints



Next Steps

- Finish creation and annotation of New Dataset using DataTorch.io
- Obtain Final Keypoint results & annotations for New Dataset
- Create Final Report & Presentation