Deep High-Resolution Representation Learning for Human Pose Estimation

COMP8240 Project Proposal - Group G

David Dela Cruz
Srikar Parimi
Shreyas Kumar Singh

Macquarie University

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Outline

Overview

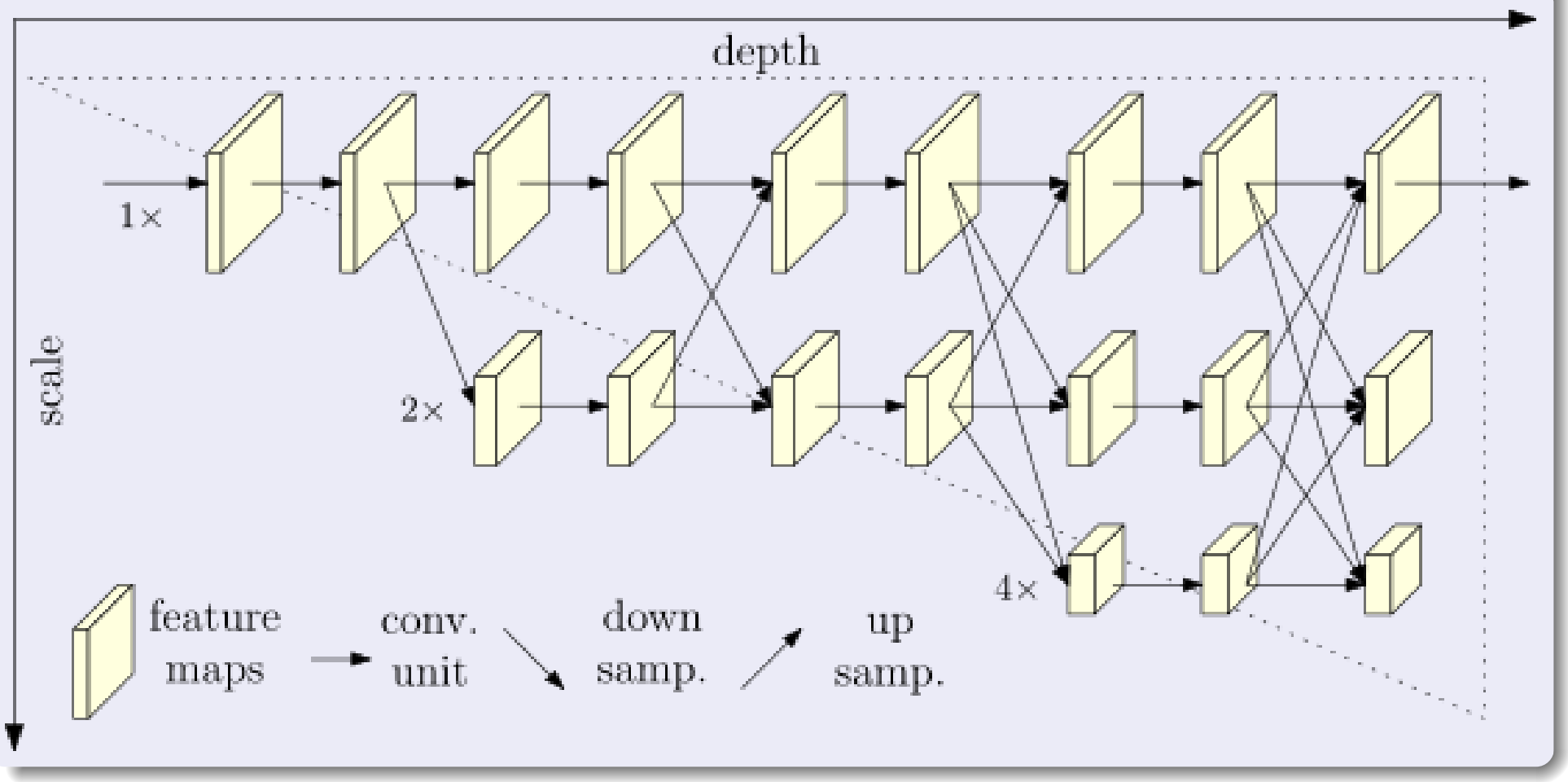
- Deep High-Resolution Representation Learning for Human Pose Estimation
- 2019 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)
- University of Science and Technology of China
- Research has obtained 1006 citations
- Human Pose Estimation Problem
  - High-Resolution Deep Neural Network (HRNet)
  - Human Keypoint Estimation (Wrists, Shoulders, Joints, etc.)
  - Top-Down: Human Detection - Single Person Keypoint Detection
  - Average Precision (AP): 76.3% (2017 Coco Dataset)
  - Average Recall (AR): 81.2% (2017 Coco Dataset)
- Pre-trained Models: https://drive.google.com/drive/folders/1hOTihvbyIxsm5ygDpbUuJ7O$_t$z
- Github Repository: https://github.com/leoxiaobin/deep-high-resolution-net.pytorch

Specifications

- Requirements
  - python 3.6
  - COCOAPI
  - EasyDict = 1.7
  - opencv-python =3.4.1.15
  - shapely =1.6.4
  - scikit-image
  - yacs > 0.1.5
  - tensorboardX =1.6
- Input
  - Images with Single/Multiple people (384×288)
- Output
  - Localization of each Person Keypoints

Model

HRNet



Datasets

Original Dataset

- 2017 COCO Dataset - Consist of 200k Training Images and 5000 Validation Images, 20000 Test Set Images
  - Keypoint Annotations - JSON Format

New Datasets

- DensePose by Facebook - large-scale ground-truth dataset with image-to-surface correspondences manually annotated on 50K images
- Dataset Creation
  - Generated from generic images scraped online.
  - Use an open-source human pose Annotation tools (Fifty-One) to generate a small dataset with Images and ground-truths

Results

Model	AP	AP^{50}	AP^{75}	AP^{M}	AP^{L}	AR
ResNet-152 (Simple Baseline)	74.3	89.6	81.1	70.5	79.7	79.7
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

Table: Coco Dataset: OKS (Object Keypoint Similarity)

Timeline

- Week 6: Obtain Original and New Datasets
- Week 7: Setup environment, libraries & code repository
- Week 8: Testing the HRNet model on Original Dataset/ Replicating the original experiment
- Week 9: Testing the Model with New Dataset.
- Week 10: Obtain evaluation metrics for Original & New Datasets
- Week 11: Document results
- Week 12: Final Project Presentation