Application of convolutional neural networks to the problem of pose detection in images

1 Description

Pose detection [1, 2, 3] involves determining the location of parts of a body and joints in an image. This is one of the most treated problems in the field of computer vision because of its usefulness for the classification of human activities. One of the most recent approaches to pose detection is based on the use of deep neural networks.

2 Objectives

The goal of this project is to implement a convolutional neural network for pose estimation. Based on an available dataset[1] of pictures where the position of body parts and joints have been labeled, the student will be free to decide which body part or joint is going to be predicted from the image.

The student should: 1) Analyze the suggested dataset. 2) Clearly state a regression or classification problem recognizable from the data (e.g., head detection, knee detection, etc.) 3) Select an appropriate CNN architecture. 3) Implement the model learning procedure to train the network. 4) Evaluate performance of the network for the selected task.

As in other projects, a report should describe the characteristics of the design, implementation, and results. A Jupyter notebook should include calls to the implemented function that illustrate the way it works.

3 Suggestions

- Read the relevant bibliography about pose estimation using CNNs and about the dataset[2]
- See different existing approaches to pose estimation[3]
- Implementations can use any Python library that implements CNNs.

References

[1] Mykhaylo Andriluka, Leonid Pishchulin, Peter Gehler, and Bernt Schiele. 2d human pose estimation: New benchmark and state of the art analysis. In *Proceedings of the IEEE Conference on computer Vision and Pattern Recognition*, pages 3686–3693, 2014.

[2] Deva Ramanan. Learning to parse images of articulated bodies. In *Advances in neural information processing systems*, pages 1129–1136, 2007.

[3] Alexander Toshev and Christian Szegedy. Deeppose: Human pose estimation via deep neural networks. In *Proceedings of the IEEE conference on computer vision and pattern recognition*, pages 1653–1660, 2014.

[1] `http://human-pose.mpi-inf.mpg.de/#download`

[2] `http://human-pose.mpi-inf.mpg.de/#references`

[3] `https://www.cs.cmu.edu/~deva/papers/parse/index.html`