Pose from Action: Unsupervised Learning of Pose Features based on Motion

Senthil Purushwalkam, Abhinav Gupta

Robotics Institute, Carnegie Mellon University

Motivation

- Human Actions are an ordered sequence of poses
- Can we leverage human action videos to learn a pose encoding representation?

- A representation in which *poses cluster together* should be useful for **Pose Estimation** and **Action Recognition**
- Given two poses, it should be possible to predict the motion between them

Surrogate Task

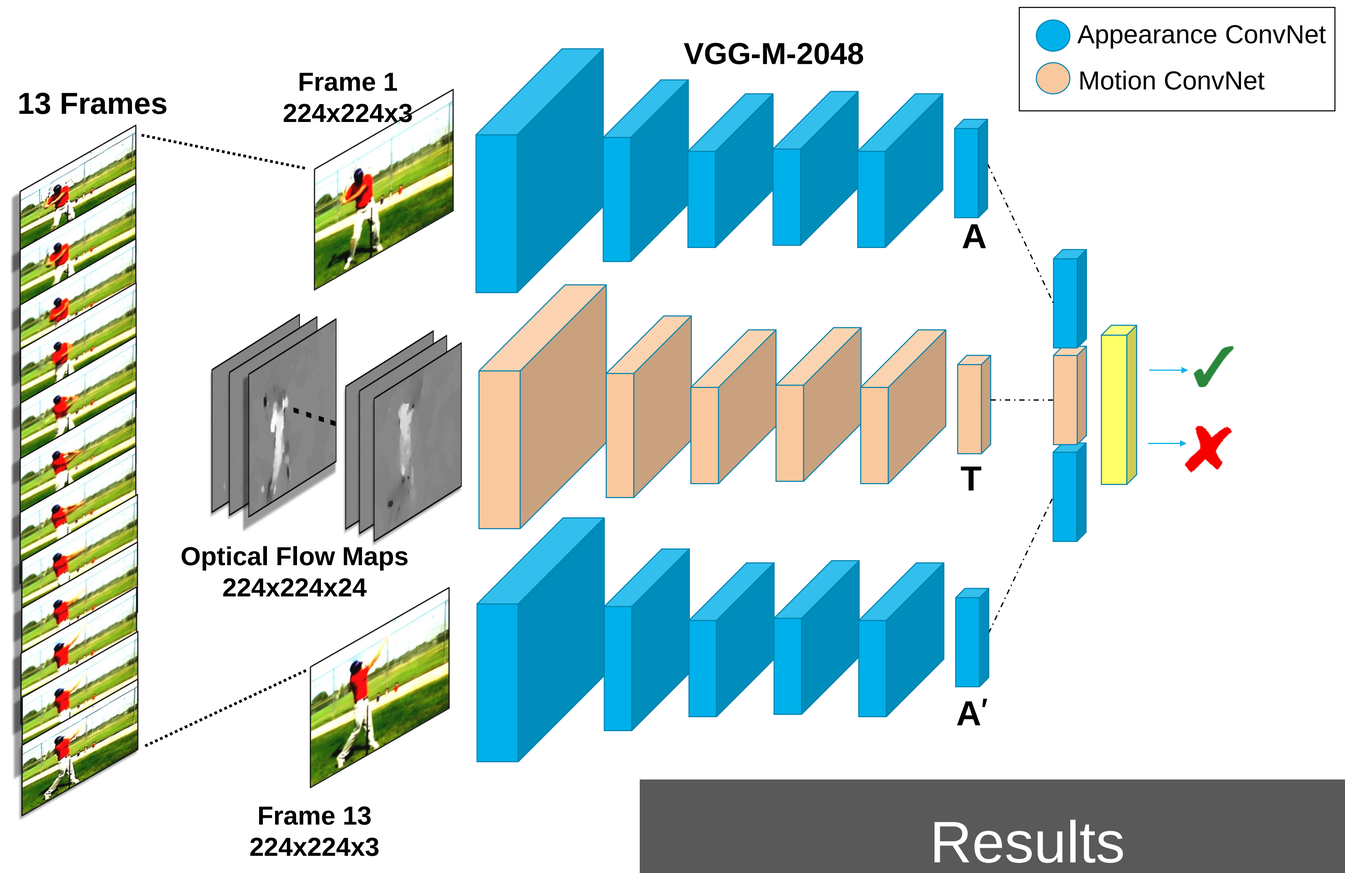
❖ Given:

- Two appearance representations **A** and **A'** (*pose*)
- One motion representation **T** (*transformation of pose*)

❖ Predict:

- If the transformation **T** could cause the change **A→A'**

Overview



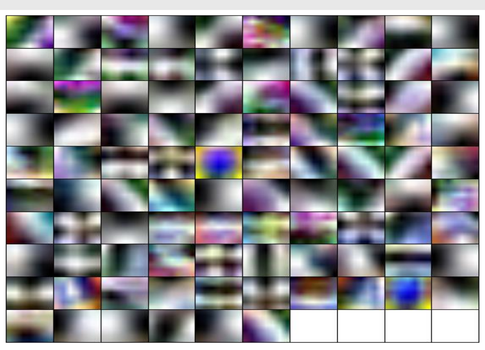
Data and Implementation

- We use videos from **UCF101**, **HMDB51** and **ACT** video datasets
- Sample two frames separated by Δn (=12) frames and extract optical flow for the Δn frames
- Use the VGG-M-2048 architecture for all CNNs

Experiments

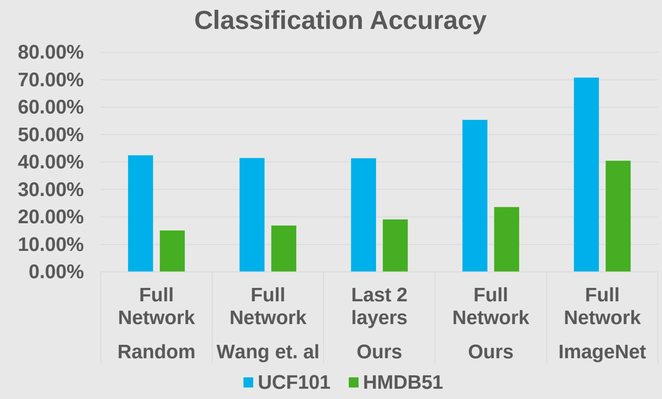
- Nearest neighbor in the FC6 feature space of the Appearance ConvNet

- Conv1 Filter Visualisation:

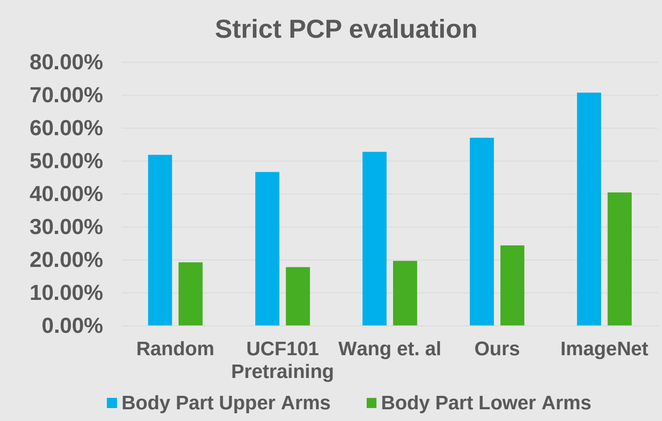


Results

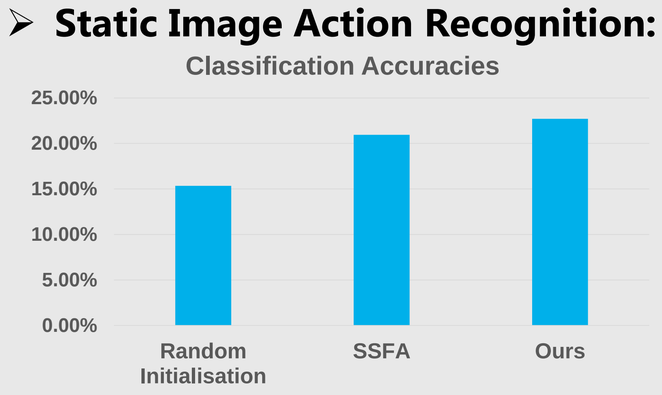
- **Action Recognition**:



- **Pose Estimation**:



- **Static Image Action Recognition:**



Paper available on arxiv at:
https://arxiv.org/abs/1609.05420