MATCHING MOTION DESCRIPTORS FOR SHORT TERM ACTION RECOGNITION

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MATCHING DESCRIPTORS I

Start with single frame matching

$$m(i,j) = \sum_{c=1}^{4} \sum_{x,y \in I} a_c^i(x,y) b_c^j(x,y)$$

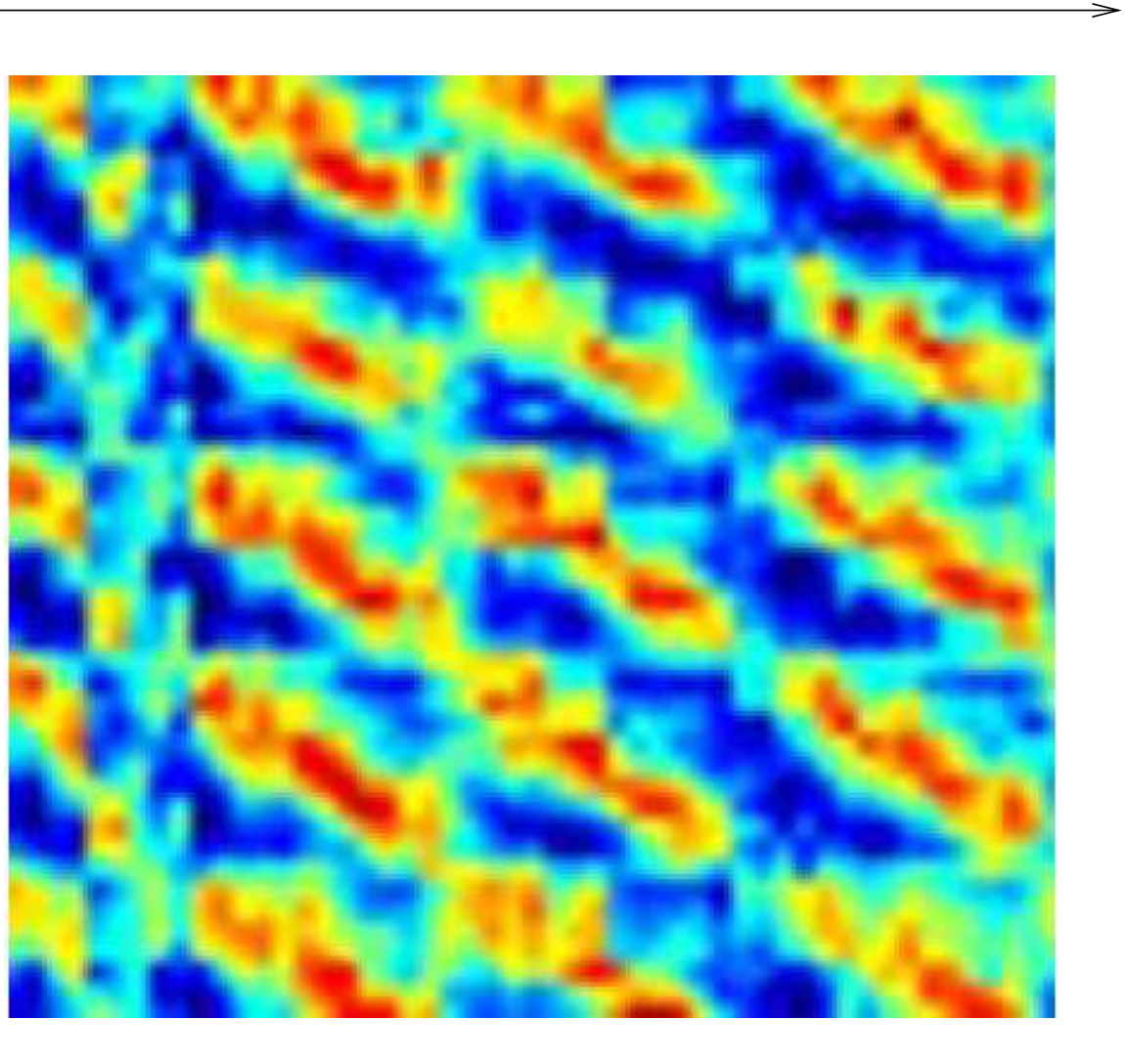
Where

Frame i of seq. a, frame j of seq. b

c = 1,2,3,4 optical flow components

(x, y) = pixel positions

FRAME i



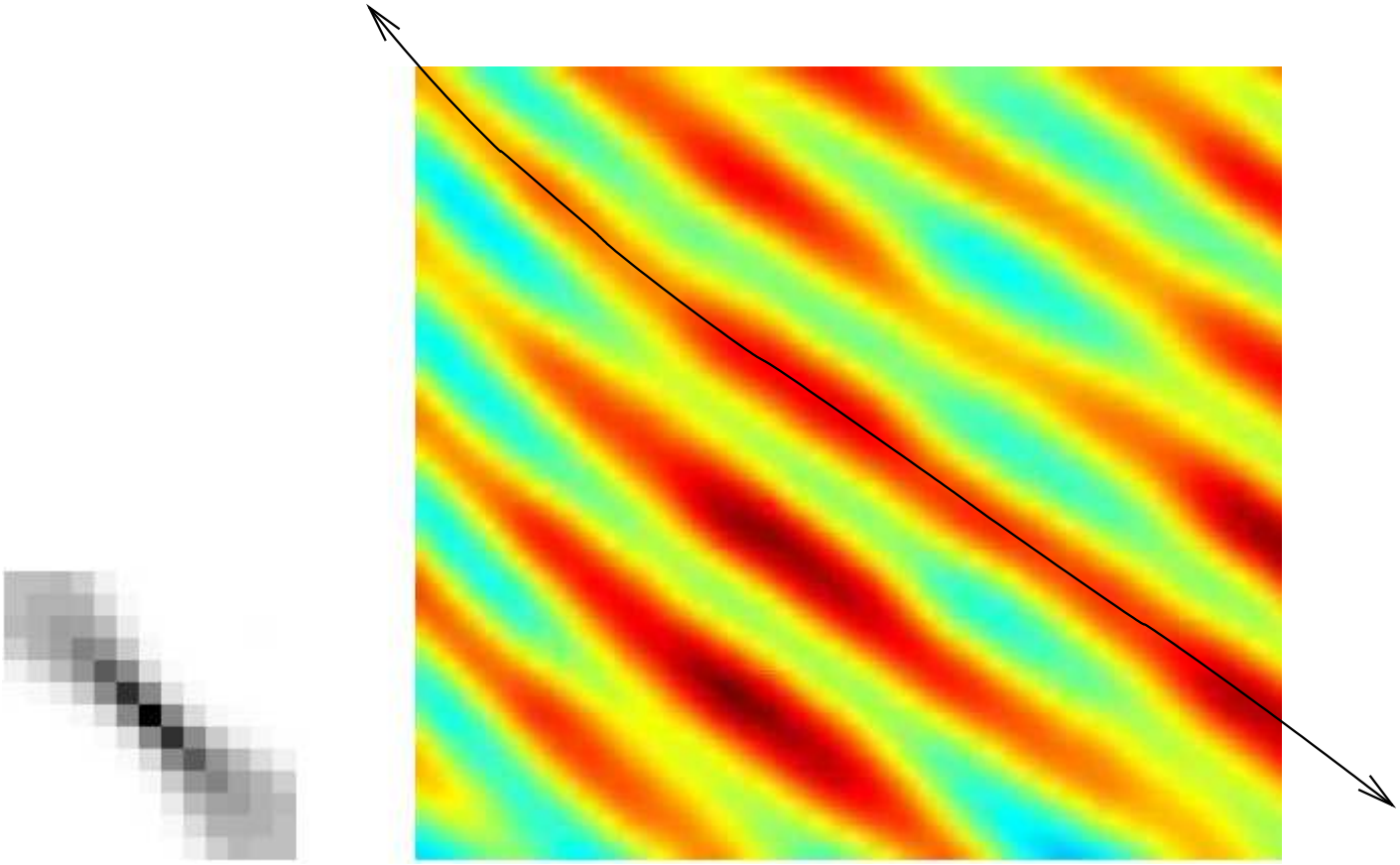
MATCHING DESCRIPTORS II

Problem: match score from a single frame a bit noisy

So use time window of $T = 50$ frames

$$S(i,j) = \sum_{r=-T/2}^{r=+T/2} \sum_{s=-T/2}^{s=+T/2} K(r,s) m(i+r, j+s)$$

Weighted sum of nearby in time frames (convolution)

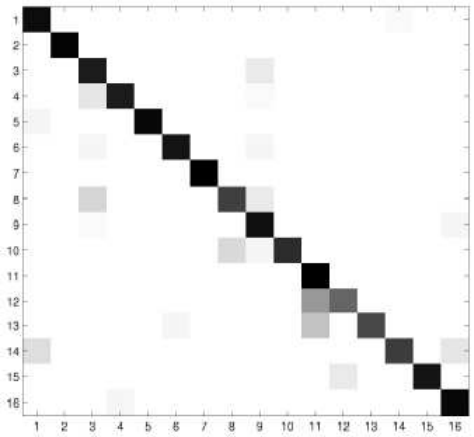


K $S(i,j)$

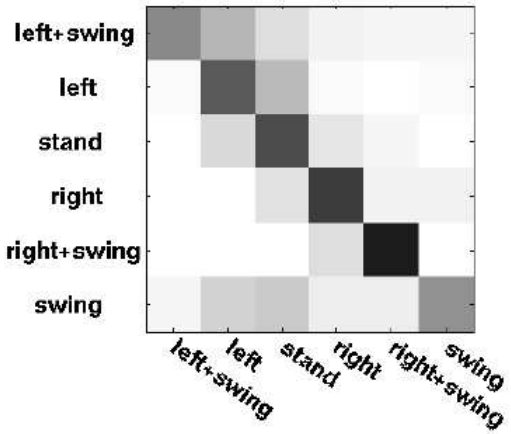
Near diagonal is matching frames
Stripes from action periodicity

EXAMPLE MATCHING SEQUENCES

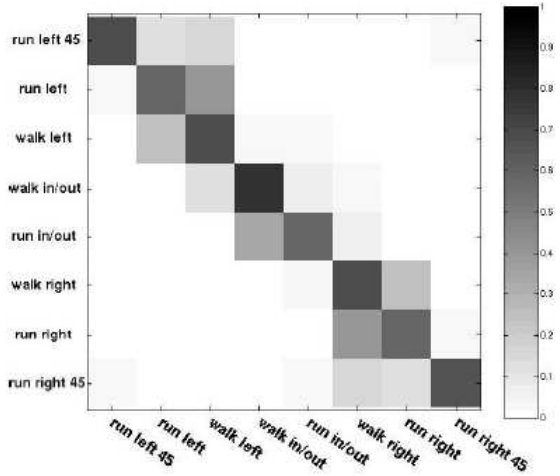
CONFUSION MATRICES



Ballet



Tennis



Football

WHAT WE HAVE LEARNED

1. Short term action recognition technique
2. Based on stabilized optical flow of local medium sized windows
3. Encodes temporal structure better
4. But: still viewpoint and scale dependent