

Human Motion: How to Evaluate Segmentation w.r.t. Retrieval

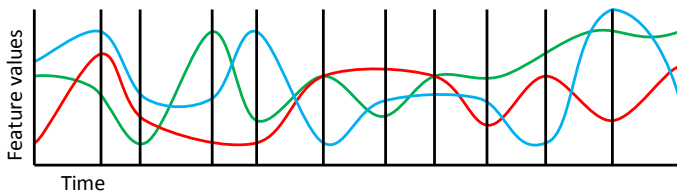
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The Goal

We have the following segmentation technique:



Our goal: Use this segmentation to improve retrieval

How?

Create a motion index at the level of segments

What can be the problems?

- representation of segments
- distance function
- clustering

Evaluation Methods

- 1) Segment-Shift Retrieval
- 2) Quality of Clustering
- 3) Segment Positions
- 4) Distance (Order) Preserving

Segment-Level Motion Retrieval

Ground truth provided – by exhaustive pose-level search

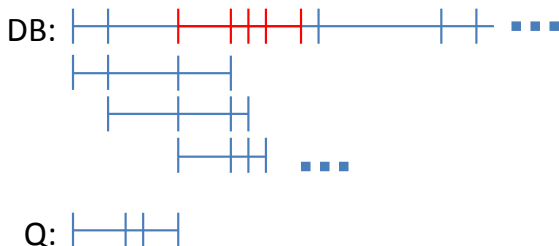
What can segments represent?

- search shift units (Segment-Shift Retrieval)
 - process all segments – not very efficient
 - retrieve all occurrences of Q in DB – most effective
- words (Text-Based Retrieval)
 - process only some segments – much more efficient
 - retrieve almost all occurrences of Q in DB – still enough effective

A typical text-based retrieval:

- 1) Partition input motion data into segments
- 2) Cluster those into groups to treat similar segments as equal
- 3) Mark the clusters with letters
- 4) Use a text-based searching technique to retrieve occurrences of Q in DB

Evaluation Method 1: Segment-Shift Retrieval

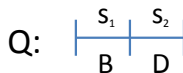
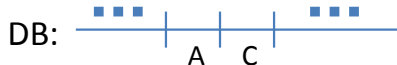
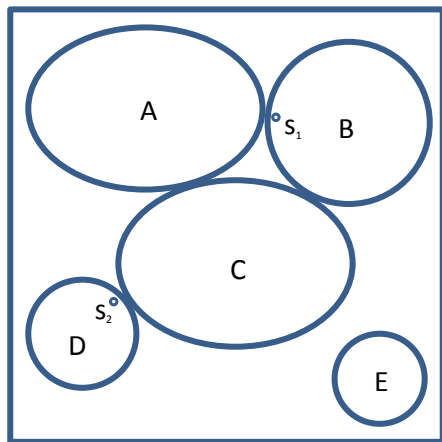


length variation $\langle \frac{n}{2}, 2n \rangle$

d_{GT} ... distance to the k -th closest occurrence of Q in ground truth

d_S ... distance to the k -th closest occurrence of Q with use of segmentation

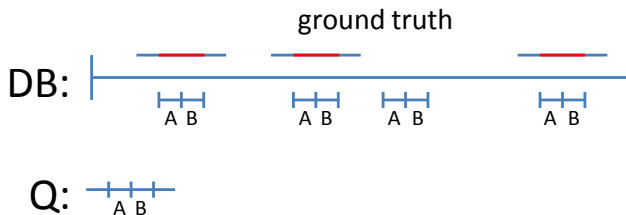
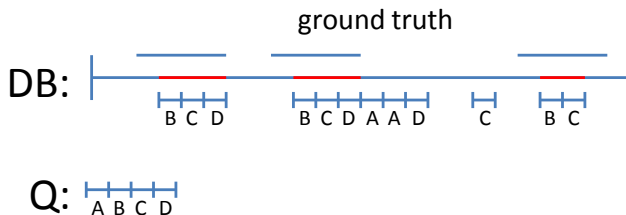
Evaluation Method 2: Quality of Clustering



DB: AABED**DA**EC...

Q: DAE

Evaluation Method 3: Segment Positions



Evaluation Method 4: Distance (Order) Preserving

motion M

compressed motion $c(M)$ - only key poses (determined by segmentation)

Distance preserving:

$$d(M_1, M_2) = d(c(M_1), c(M_2))$$

Distance order preserving:

$$d(M_1, M_2) \leq d(M_3, M_4) \Rightarrow d(c(M_1), c(M_2)) \leq d(c(M_3), c(M_4))$$

