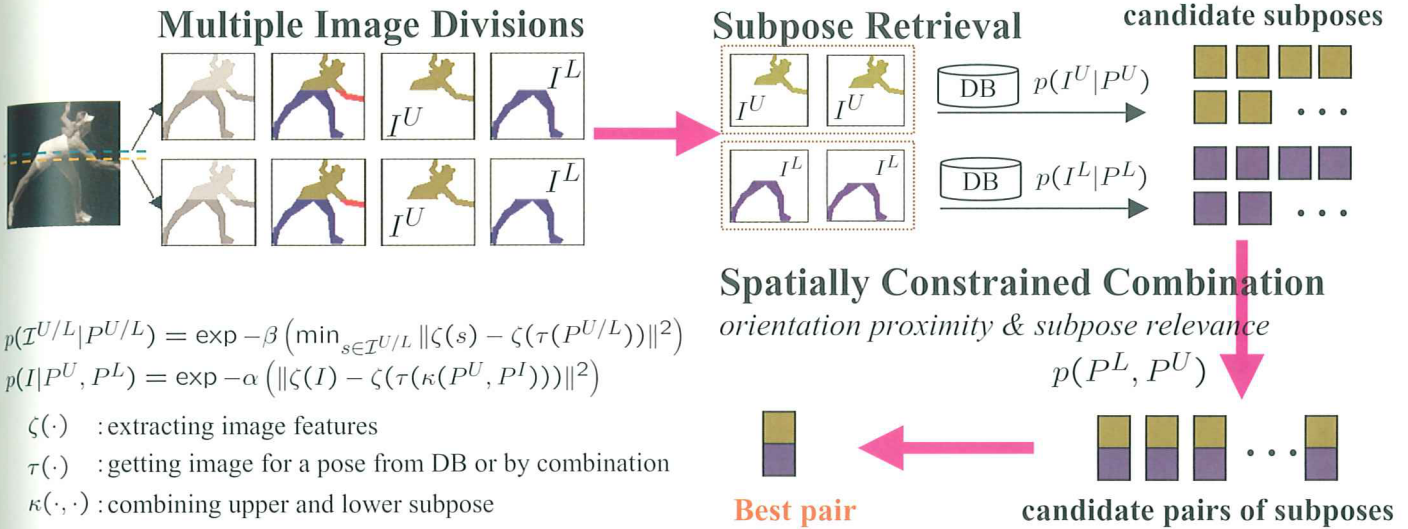


Recovering Human Pose by Collaborative Generative Models Estimation

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Retrieving candidate pairs of subposes by $p(I^L|P^L)p(I^U|P^U)p(P^L, P^U)$

Finding the best pair which maximizes $p(I^L|P^L)p(I^U|P^U)p(P^L, P^U) + p(I|P)p(P)$



$$p(\mathcal{I}^{U/L}|P^{U/L}) = \exp -\beta (\min_{s \in \mathcal{I}^{U/L}} \|\zeta(s) - \zeta(\tau(P^{U/L}))\|^2)$$

$$p(I|P^U, P^L) = \exp -\alpha (\|\zeta(I) - \zeta(\tau(\kappa(P^U, P^L)))\|^2)$$

- $\zeta(\cdot)$: extracting image features
- $\tau(\cdot)$: getting image for a pose from DB or by combination
- $\kappa(\cdot, \cdot)$: combining upper and lower subpose

Experimental Results

DB consists of 200 poses picked from motion sequences (dancing, walking, etc.), and images rendered by CG program from 36 equally-spaced viewpoints; **Test data** are 50 real images of complex human poses.

Examples of image division

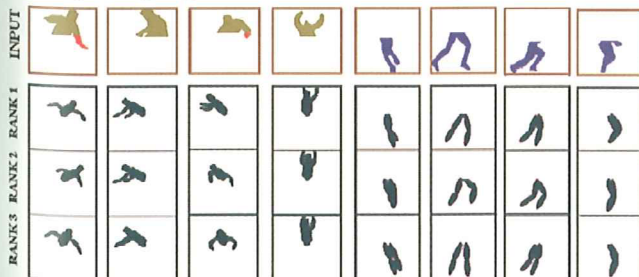


	Synthetic images	Real images
Num. of successes	200 (200)	48 (50)
Rate of success	100%	96%

Examples of CG rendering of estimated pose



Examples of top-ranked retrieved subposes



	Num of Retr. Cand.	1	5	10
		upper pose	Mean (%)	4.45
	S.D. (%)	0.75	0.52	0.43
lower pose	Num of Retr. Cand.	1	5	10
		Mean (%)	3.18	2.54
	S.D. (%)	0.53	0.42	0.34

Error evaluation function

$$\frac{1}{H} \times \sqrt{\frac{\sum_{i=1}^{3N} \|p_i^{est} - p_i^{real}\|^2}{N}}$$

Dataset	Num	Mean Error(%)	S.D.(%)
Random set1	40	5.98	0.88
Random set2	40	3.90	0.77
Ballet	300	3.94	1.16
Basketball	100	3.34	0.47