Discriminative Pose-Free Descriptors for Face and Object Matching

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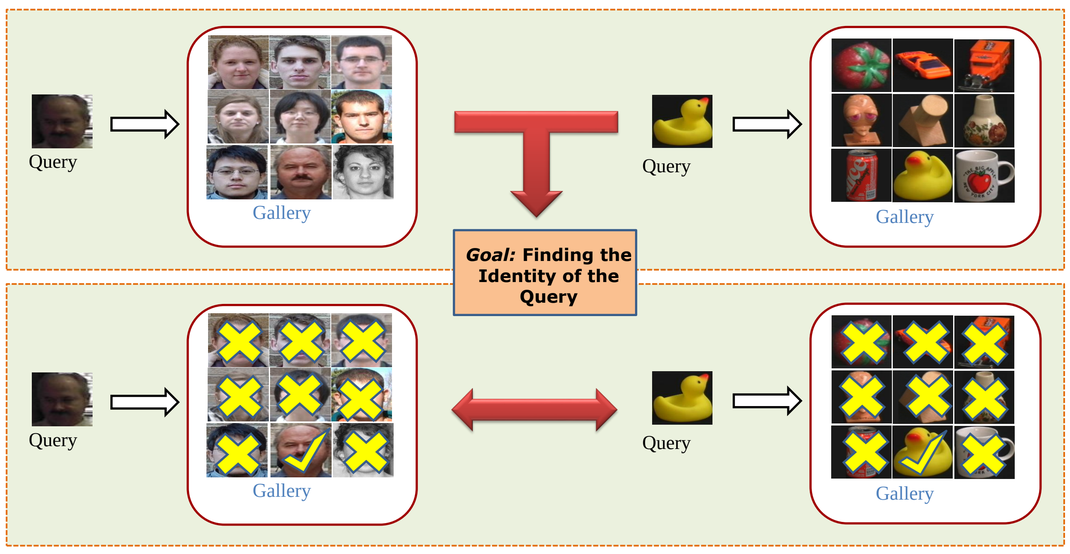
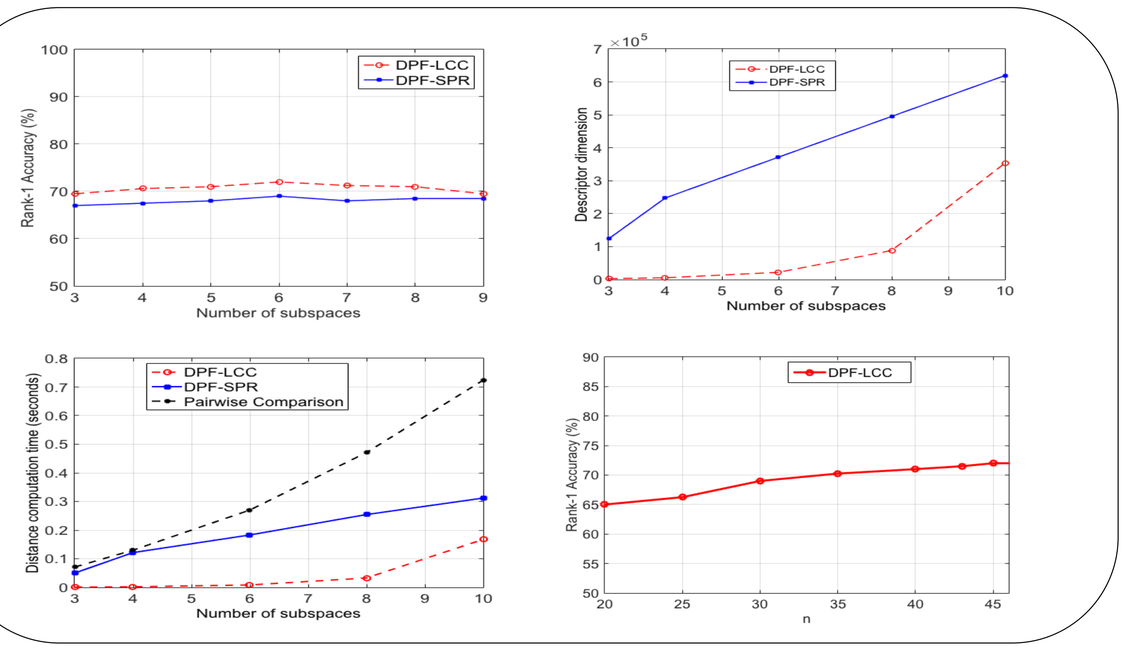
Pose Invariant Matching

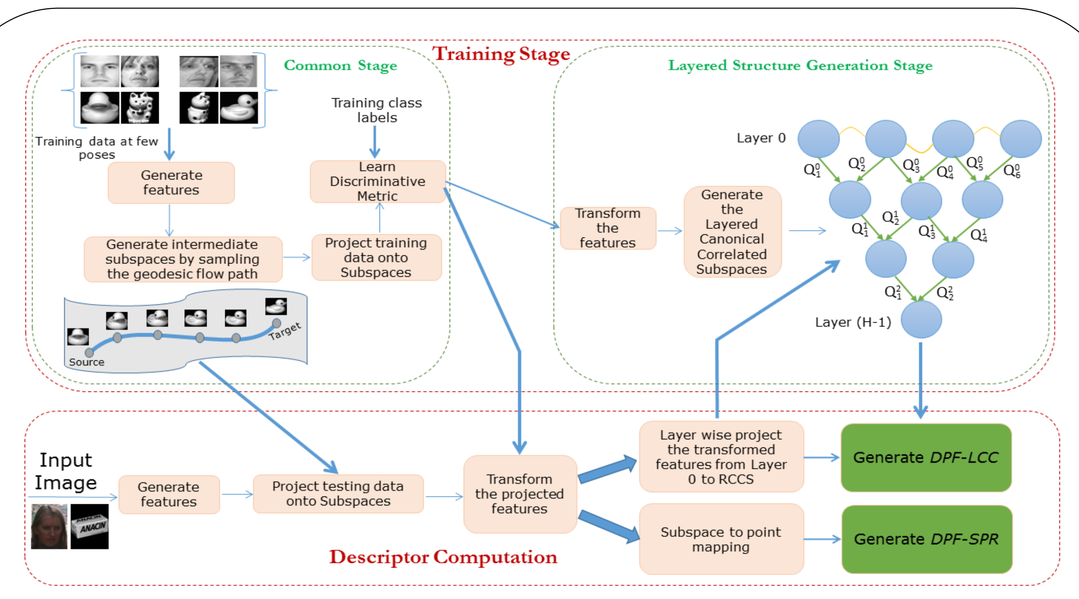


(Images are taken from MBGC dataset and COIL 100 dataset)

Analysis of the proposed descriptors



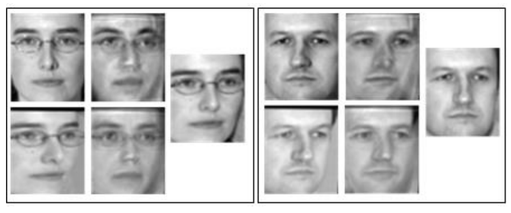
Proposed Approach



Flow Chart of the proposed approach

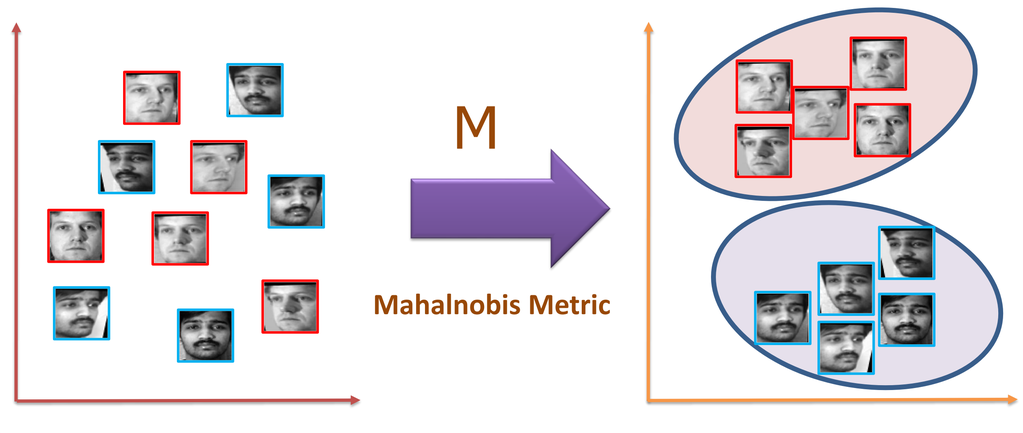
Feature Representation using Intermediate Subspaces

Top: Training images from 3 different parts of the pose space (left pose, frontal, right pose). Bottom: Virtual subspaces generated from training data.



- **Second column of each subject is the reconstructed pose whereas third column is the original image of that pose.**
- **Reconstructed image is similar to that of the interpolated pose.**

Discriminative Transformation Learning



Experimental Results

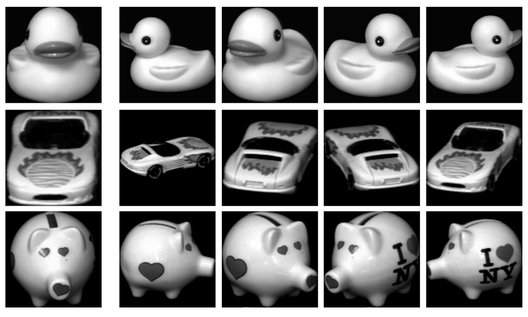
Face Recognition Across Pose and Resolution:

Method	Pose 13_0	Pose 14_0	Pose 05_0	Pose 04_1
MDS Learning [TPAMI'13]	32.8	44.8	47.0	48.5
LSML [CVPR'12]	46.9	53.9	55.2	54.3
GMA [ICCV'12]	65.0	70.1	70.3	64.2
SCDL [CVPR'12]	66.3	73.0	72.7	64.1
CFDL [ICCV'13]	65.9	72.0	72.8	64.7
Proposed (PFD)	65.9	71.2	64.2	56.4
Proposed (DPF-SPR)	**74.5**	**78.0**	**74.0**	**70.1**
Proposed (DPF-LCC)	**75.5**	**78.0**	**78.1**	**74.7**

Results on Surveillance Cameras Face Database:

Method	Rank-1 1 Cam	Rank-1 5 Cam
MDS Learning [TPAMI'13]	30.0	61.1
LSML [CVPR'12]	64.7	67.2
GMA [ICCV'12]	38.2	50.5
SCDL [CVPR'12]	48.2	58.5
CFDL [ICCV'13]	45.7	62.2
Proposed (PFD)	46.0	--
Proposed (DPF-SPR)	**69.0**	--
Proposed (DPF-LCC)	**72.0**	--

Object Recognition Across Pose:



Sample Images from COIL-20 Database [Technical Report, 1996].

Method	% Rec.
MDS Learning	75.6
LSML [CVPR'12]	80.3
GMA [ICCV'12]	66.1
SCDL [CVPR'12]	79.2
CFDL [ICCV'13]	78.7
Proposed (PFD)	67.4
Proposed (DPF-SPR)	**82.2**
Proposed (DPF-LCC)	**83.0**

Publications

- S. Sanyal, S. P. Mudunuri, S. Biswas, Discriminative pose free descriptors for face and object matching, ICCV 2015
- S. Sanyal, S. P. Mudunuri, S. Biswas, Discriminative pose free descriptors for face and object matching, Pattern Recognition, 2017
- S. Sanyal, D. Mandal, S. Biswas, Aligned discriminative pose robust descriptors for face and object recognition, submitted in ICIP, 2017