Robust 3D-Aided face recognition: Rendering or Pose-Normalization ?

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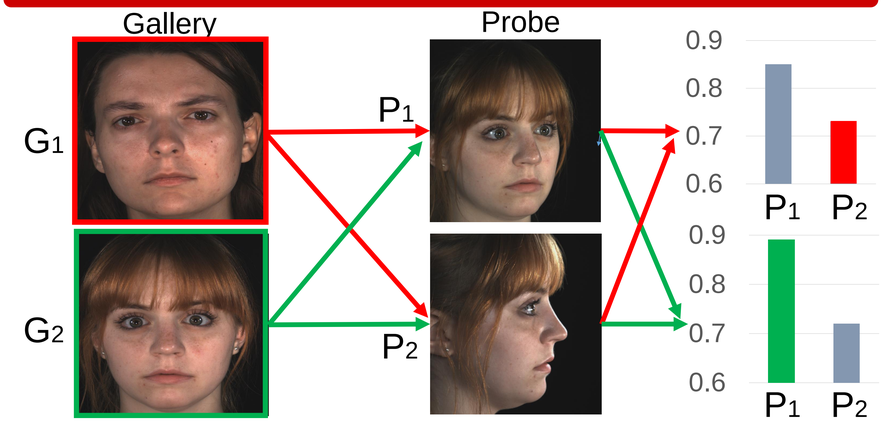
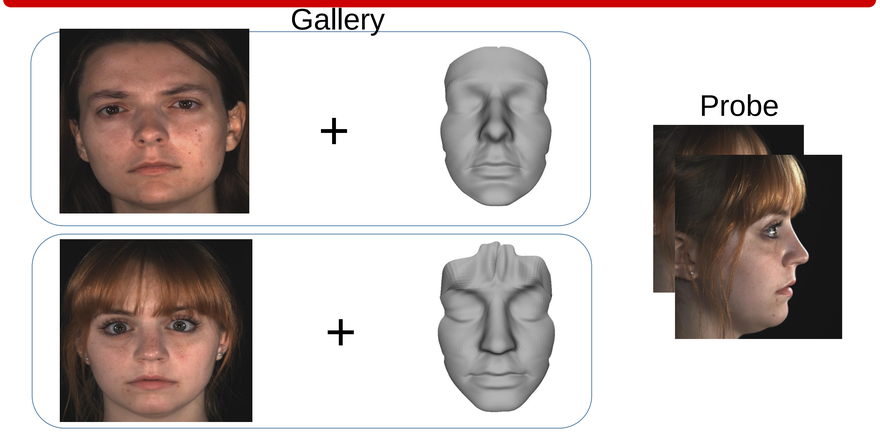
2D-2D FR

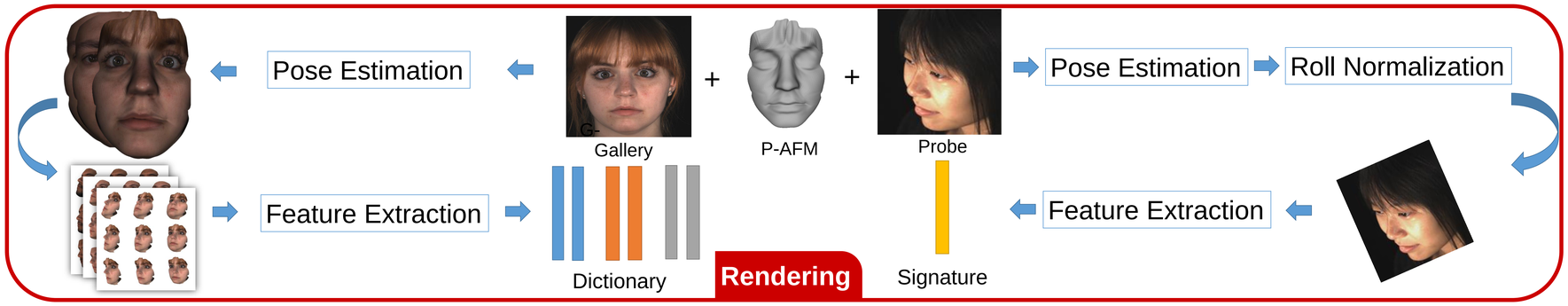


3D-Aided FR



Evaluation Protocal: View N vs. View 11

Enrollment



Matching

Experiment 2: Robustness under pose perturbation

Rendering: Difference of mis-classified after pose perturbation [-6°,6°]

+0	+3	+1	+1	+1	+3	+4
+4	+0	+0		+2	+1	+1
+5	+3	+1	+1	+5	+2	-1

Pose-Normalization: Difference of mis-classified after pose perturbation [-6°,6°]

+4	+13	+6	+0	+2	+13	+9
+12	+5	+0		+1	+6	+13
+6	+7	+2	+1	+6	+15	+10

Rendering vs. Pose-normalization

R	R	R	N	R	R	R
R	R	R*		N	R	R
R	R	R	R*	R	R	R

Experiment 1: Rank-1 Identification

Rendering + P-AFM

37.7	96.1	98.7	100.0	100.0	90.9	31.2
87.0	98.7	98.7		100.0	100.0	85.7
40.3	70.1	96.1	97.4	98.7	74.0	41.6

Pose-Normalization + P-AFM

41.6	77.9	98.7	100.0	100.0	81.8	40.3
42.9	90.9	100.0		100.0	82.2	54.5
31.2	66.2	100.0	100.0	100.0	67.5	31.2

Rendering+ G-AFM

24.7	88.3	98.7	100.0	98.7	79.2	31.2
59.7	94.8	98.7		100.0	97.4	64.9
23.4	64.9	94.8	100.0	97.4	76.6	29.9

Pose-Normalization + G-AFM

40.3	74.0	98.7	100.0	98.7	90.9	46.8
55.8	81.8	98.7		100.0	87.0	54.5
31.2	63.6	98.7	100.0	100.0	68.8	28.6

HOG
SIFT
BSIF
SIFT/BSIF

P-AFM vs. G-AFM (Rendering)

P	P	P*	P*	P	P	P*
P	P	P*		P*	P	P
P	P	P	G	P	G	P

P-AFM vs. G-AFM (Pose-Normalization)

P	P	P*	P*	P	G	G
G	P	P		P*	G	P*
P*	P	P	P*	P*	G	P

Experiment 1: Comparison

Rendering vs. Pose-Normalization

N	R	N*	N*	N*	R*	N
R	R	N		N*	R	R
R	R	N	N*	N	R	R

P-AFM vs. G-AFM

P	P	P*	P*	P*	P*	G
P	P	P		P*	P	P
P	P	P	G	G	G	P

- Rendering-based method resulted in better rank-1 identification rate
- P-AFM performed better than G-AFM

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