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Benchmarking Head Pose Estimation In-The-Wild

Elvira Amador, Roberto Valle
Dep. Inteligencia Artificial
Univ. Politécnica de Madrid
Boadilla del Monte, Spain
rvalle@fi.upm.es

José Miguel Buenaposada
Dep. Ciencias Computación
Univ. Rey Juan Carlos
Móstoles, Spain
josemiguel.buenaposada@urjc.es

Luis Baumela
Dep. Inteligencia Artificial
Univ. Politécnica de Madrid
Boadilla del Monte, Spain
lbaumela@fi.upm.es

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Abstract

What? We review the problem of estimating head pose by regressing the yaw, pitch and roll head angles from images acquired "in-the-wild".

Why? Key preprocessing step for several tasks such as facial attributes estimation, human machine interaction, focus of attention, gaze, etc.

Contributions

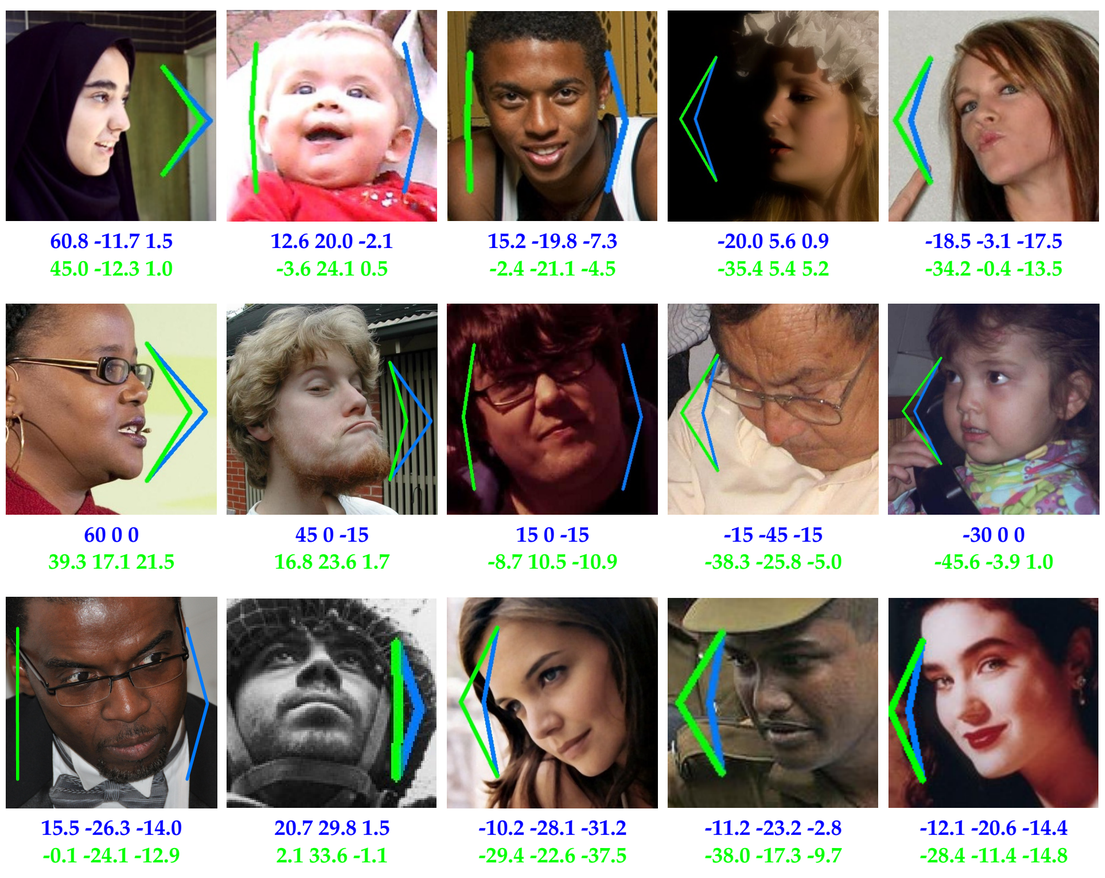
- A brief survey of the best head pose estimation algorithms.
- Definition of an evaluation methodology and publicly available benchmark to precisely compare the performance of head pose estimation algorithms.
- The establishment of the state-of-the-art on this benchmark.

Benchmarking head pose

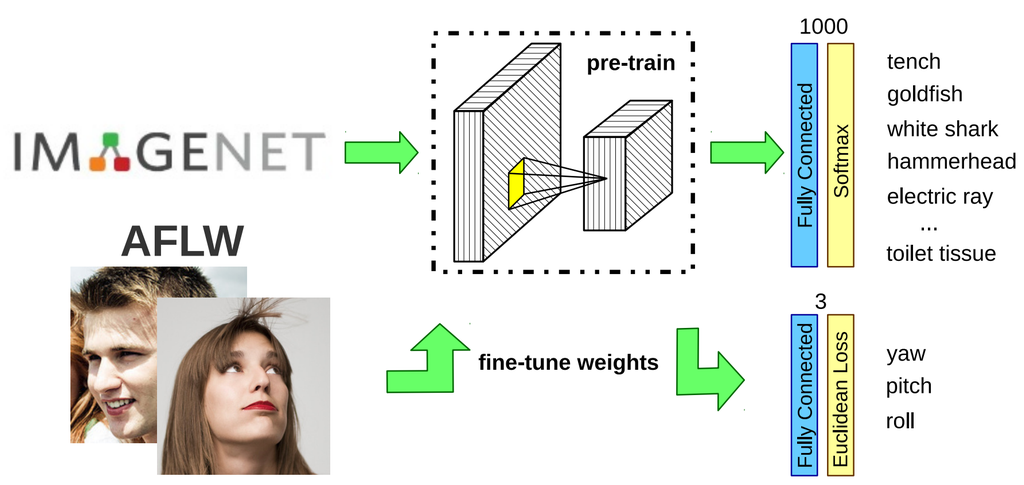
To have comparable results all algorithms should use the same train, validation and test data-sets publicly available, hence it is impossible to make a fair comparison among any of these approaches.

Method	AFLW (MAE) yaw	pitch	roll	AFW yaw	300W (MAE) yaw	pitch	roll
Peng *et al*. [5]	-	-	-	86.3%	-	-	-
Valle *et al*. [9]	12.26°	-	-	83.54%	-	-	-
Gao *et al*. [1]	6.60°	5.75°	-	-	-	-	-
Yang *et al*. [10]	-	-	-	-	4.20°	5.19°	2.42°
Ranjan *et al*. [6]	7.61°	6.13°	3.92°	97.7%	-	-	-
Kumar *et al*. [4]	6.45°	5.85°	8.75°	96.67%	-	-	-

Results



Transfer learning methodology



Experiments in-the-wild

We provide regressors based on AlexNet, VGG, GoogLeNet and ResNet.

Method	AFLW (MAE) yaw	pitch	roll	AFW yaw	300W (MAE) yaw	pitch	roll
AlexNet [3]	6.28°	5.02°	3.36°	86.32%	6.86°	6.61°	5.82°
GoogLeNet [8]	6.40°	5.31°	3.74°	**95.51%**	5.71°	7.99°	6.85°
VGG-16 [7]	6.23°	4.96°	3.35°	85.68%	6.35°	7.02°	5.98°
VGG-19 [7]	5.78°	4.79°	3.20°	94.23%	5.56°	6.35°	4.65°
ResNet-50 [2]	6.00°	4.90°	3.14°	94.44%	5.71°	5.91°	3.23°
ResNet-101 [2]	**5.59°**	**4.79°**	**2.83°**	94.44%	**5.13°**	**5.87°**	**3.03°**
ResNet-152 [2]	5.61°	4.79°	3.03°	94.01%	5.52°	6.16°	3.18°

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