



Performance assessment of face analysis algorithms with occluded faces

Authors

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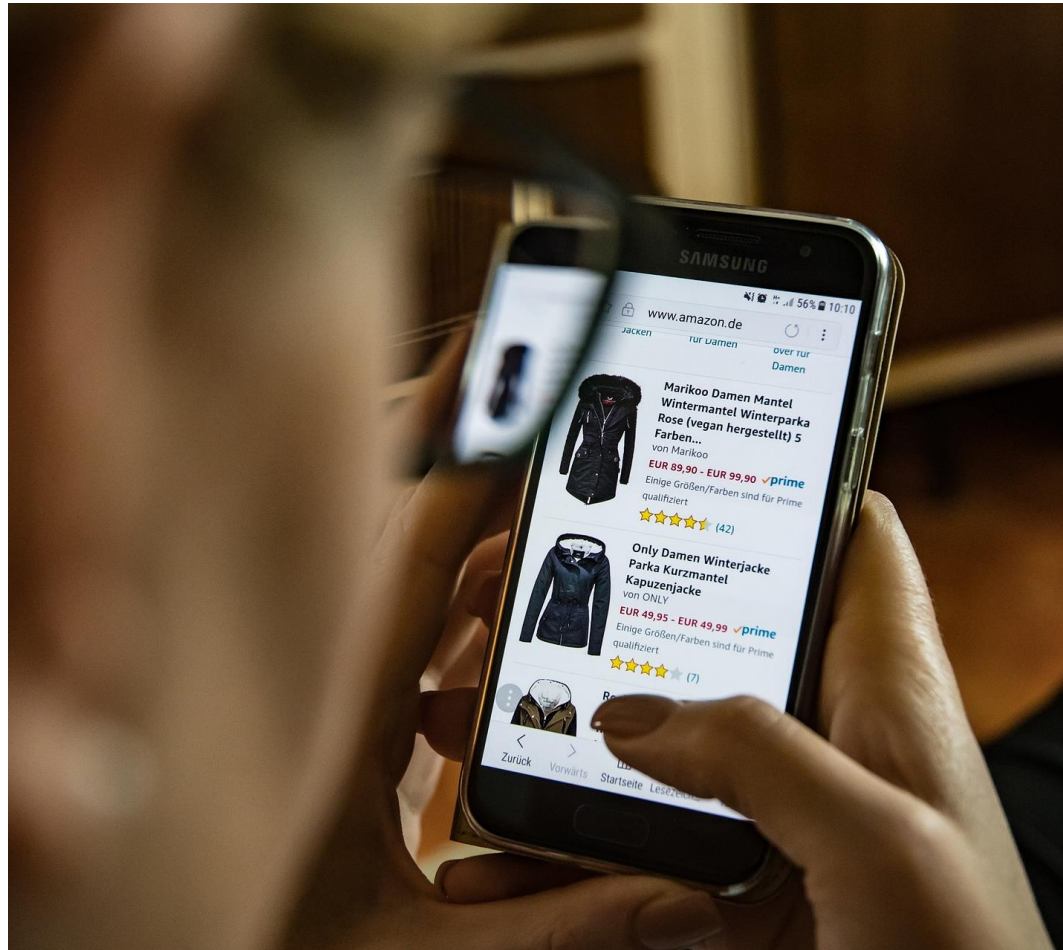
UNIVERSITÀ
DEGLI STUDI
DI SALERNO



Information is power



Online shopping



Brick and mortar



Information is power



Demographics: Overview ✓

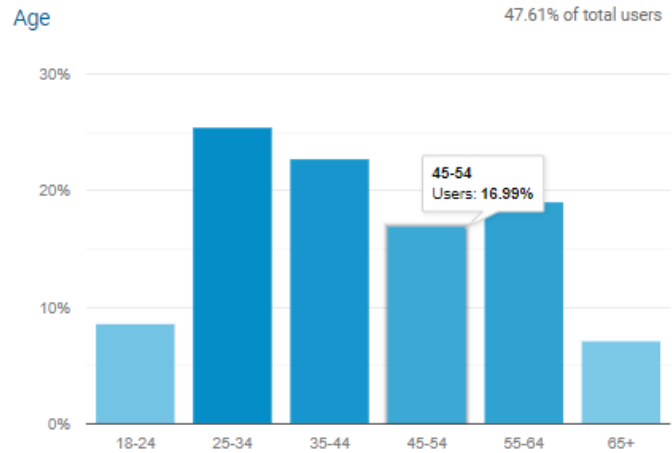
SAVE EXPORT SHARE INSIGHTS

All Users
100.00% Users

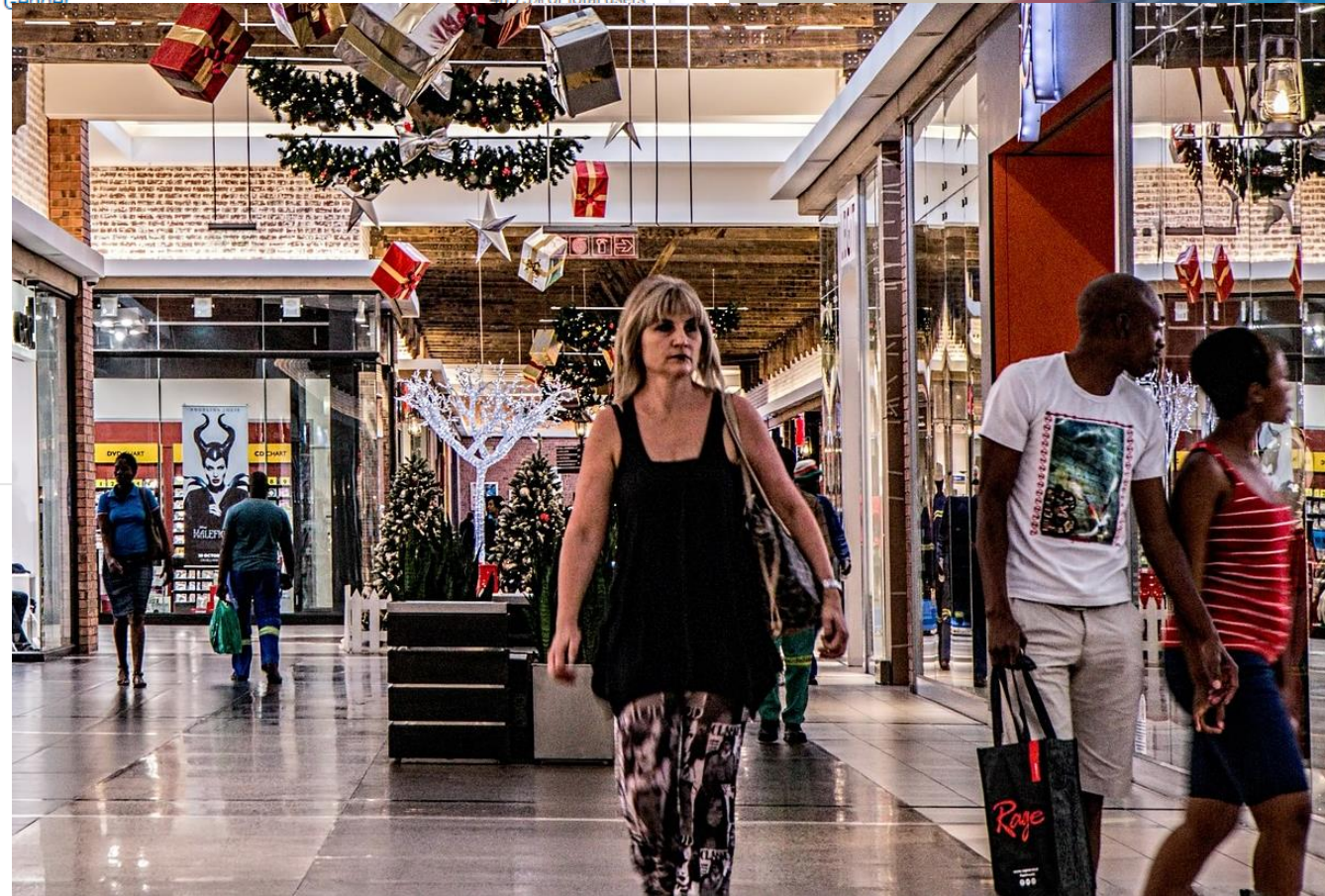
+ Add Segment

Dec 21, 2020 - Dec 27, 2020

Key Metric: Users



Gender 49.75% of total users



- Online analytics
- Fidelity cards
- Facial analytics

Information is power



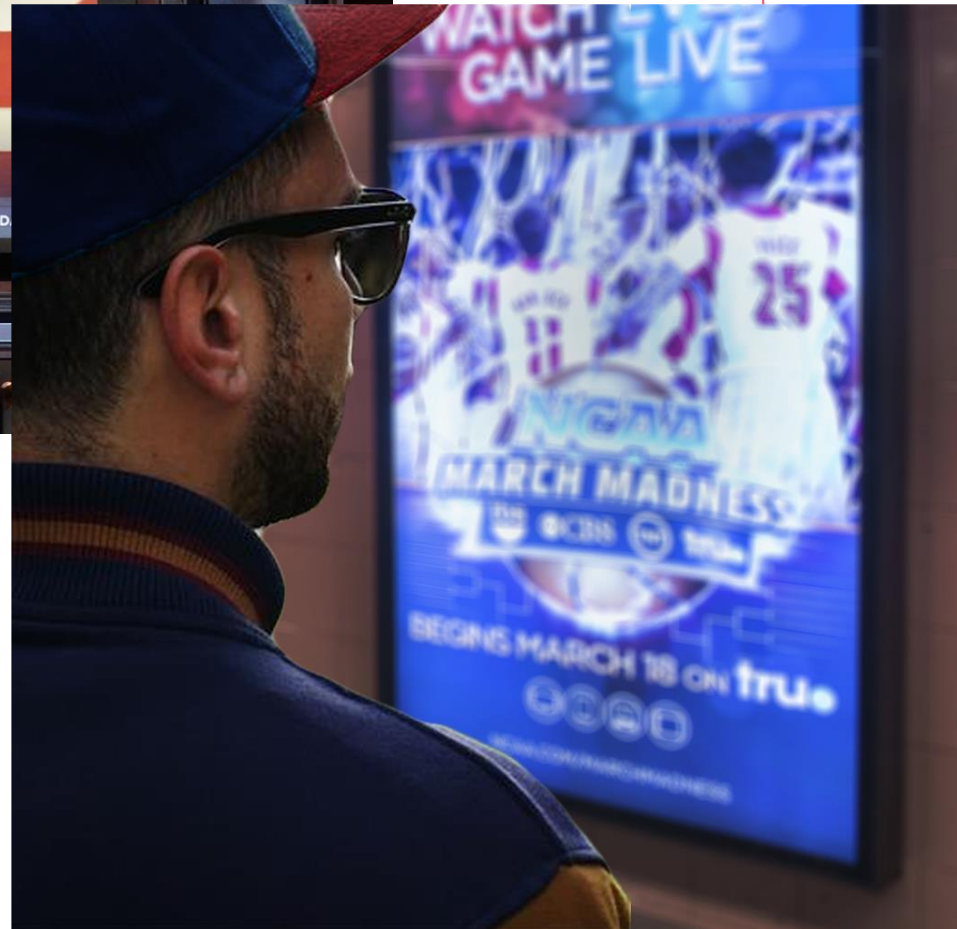
Advertising then



Advertising now

The image is a screenshot of a Facebook post from Webflow. The post is sponsored and features a video player showing a website design for 'THE ROSE SHOP'. The website design includes a large rose illustration, a 'WELCOME!' message, and a 'SHOP NOW' button. The Facebook post text reads: 'Easily create immersive interactions and animations.' Below the video, the text says: 'WEBFLOW.COM Build website animations and interactions visually Webflow's interactions and animations tools bring all the power of CSS and ...'. The post has 950 likes, 51 comments, and 90 shares. The interaction buttons for Like, Comment, and Share are visible at the bottom.

Information is power



- Online advertising
- TV
- Digital signage

Create Audience

Select the location, age, gender and interests of people you want to reach with your ad.

Audience Name ⚠

Men Women

65+

more locations

getting [Browse](#) →

ing features, go to .

Potential Reach: 35,000,000 people

Your audience selection is fairly broad.

Face Analysis is a difficult task!



- “in the wild” setting
 - Uncontrolled Illumination
 - Unconstrained pose and distance
 - High noise, low contrast and detail
 - Occlusions (glasses, scarfs, hats...)



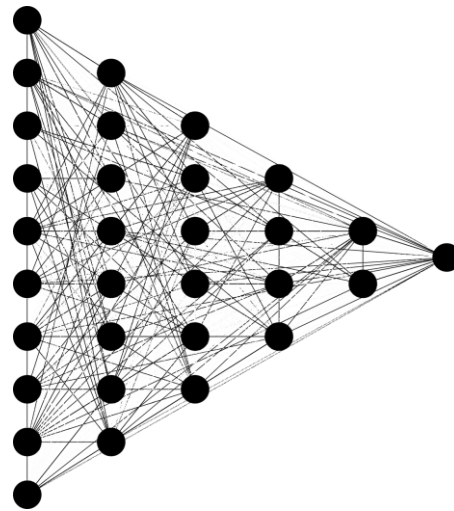
- **AND NOW FACE MASKS!!!**



Deep Learning for Face Analysis



- Widely adopted for “in the wild” scenarios
- Not completely resilient to corruptions (noise, blur, etc)*
- Will they be resilient to face masks?



*Gender recognition in the wild: a robustness evaluation over corrupted images

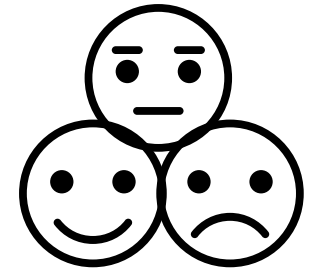
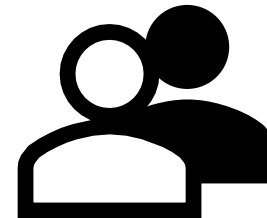
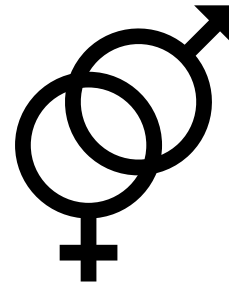
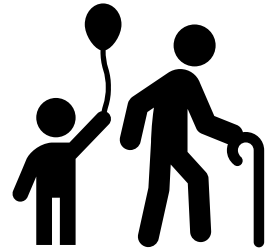
Journal of Ambient Intelligence and Humanized Computing, 1-12, 2020 - A Greco, A Saggese, M Vento, V Vigilante

Experimental framework



- Tasks:

- Age
- Gender
- Ethnicity
- Emotion



- Comparison:

- performance on regular dataset
- performance on masked dataset

Experimental framework



- Datasets
 - LFW+
 - Age, gender, ethnicity (white/no)
 - 3 annotators
 - RAF-DB
 - 6 basic emotion + neutral
 - 40 annotators
- Masked datasets
 - LFW+M*
 - RAF-DB-M



* Wang, Z., Wang, G., Huang, B., Xiong, Z., Hong, Q., Wu, H., Yi, P., Jiang, K., Wang, N., Pei, Y., Chen, H., Miao, Y., Huang, Z., Liang, J. Masked face recognition dataset and application. - arXiv preprint arXiv:2003.09093 (2020)

Experimental framework

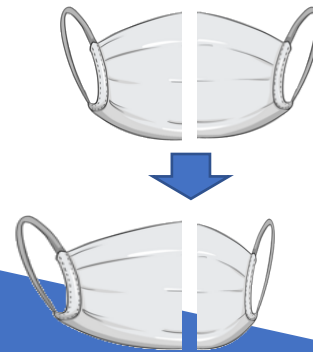


- Masked versions are synthetically generated



Facial landmarks

- Dlib detector
- 4/68 points used
- chin and nose



Split & resize

- Each half resized to match the pose
- Stitch back together



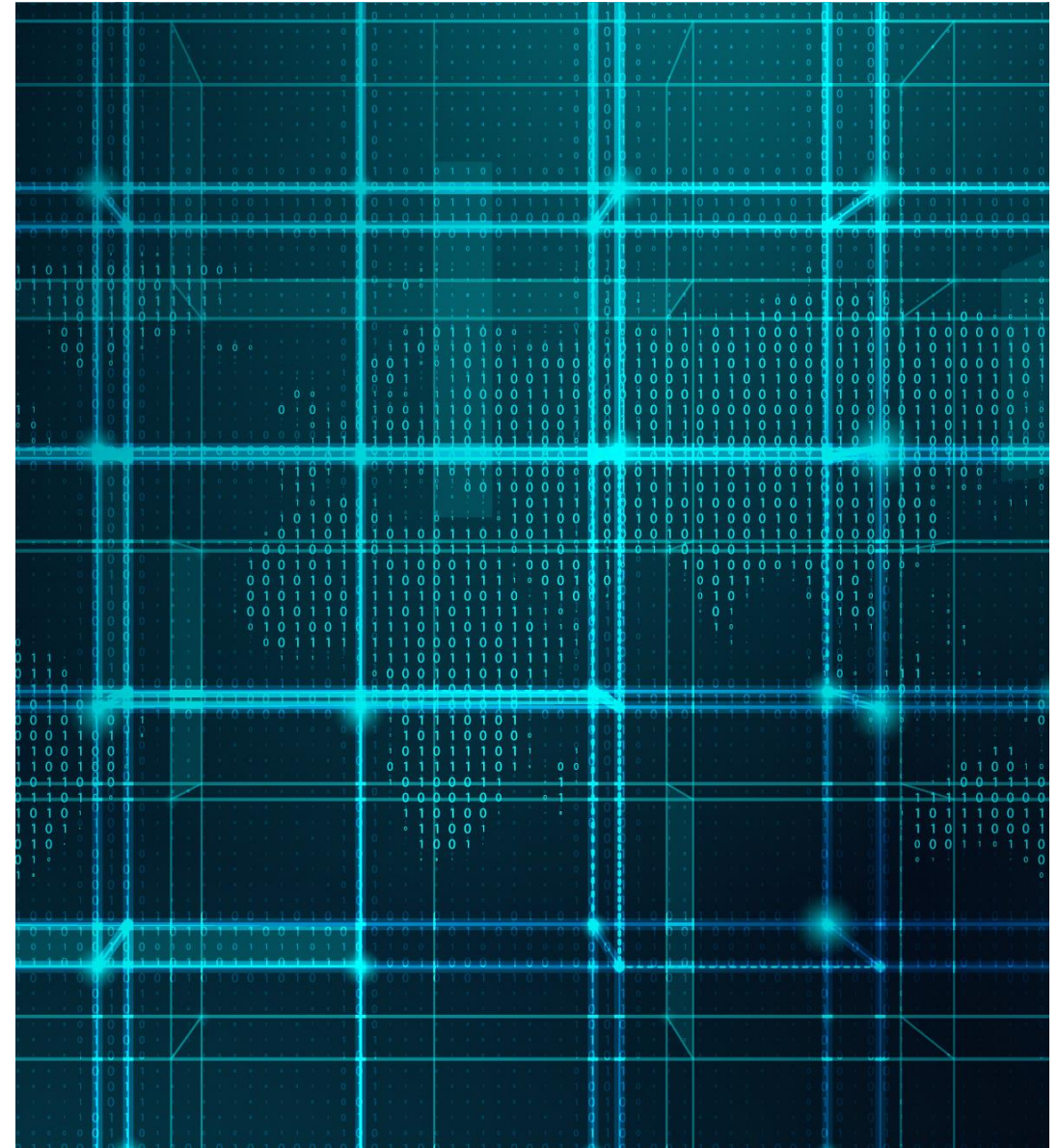
Rotate & apply

- Rotate
 - chin to nose vector
- Position
 - Bottom = chin
- Paste the mask

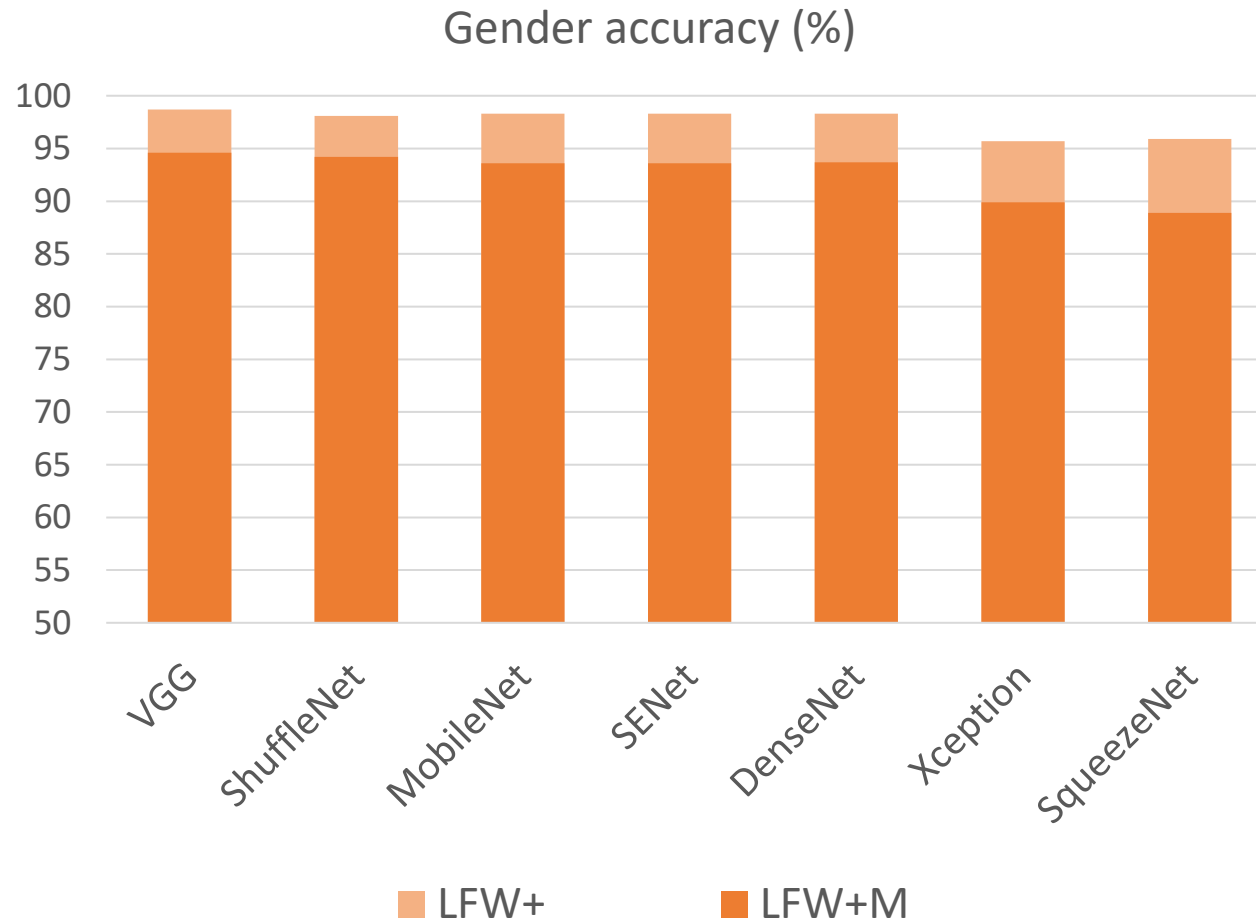
Experimental framework



- Network architectures:
 - VGG-16
 - SE-ResNet-50
 - DenseNet
 - MobileNet v2
 - ShuffleNet
 - SqueezeNet
 - Xception



Results



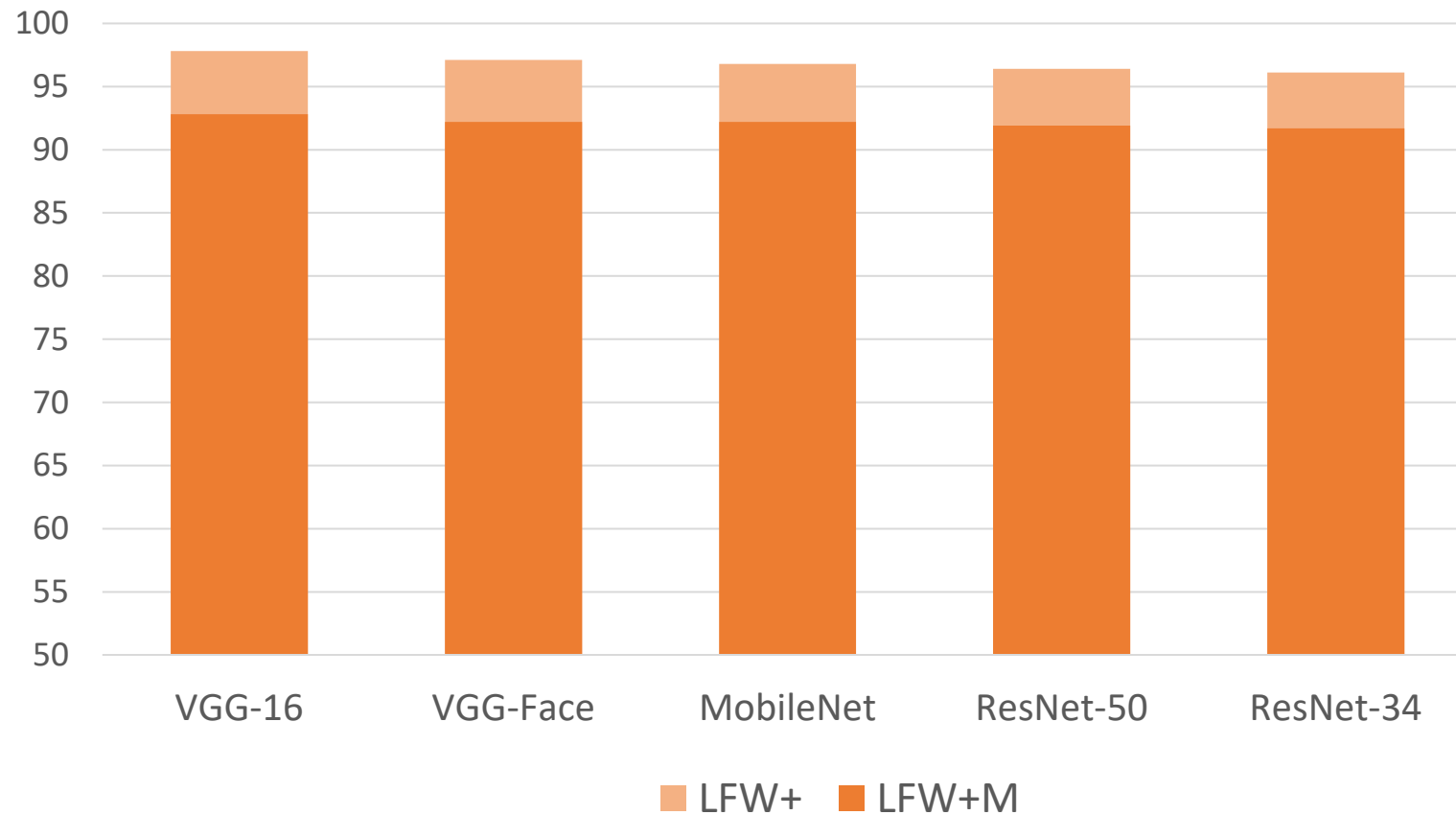
Average drop:

- 5.1% (LFW+)

Results



Ethnicity accuracy (white/non white, %)



Small drop

- 4~5%

Results



African
American

East Asian

Caucasian
Latin

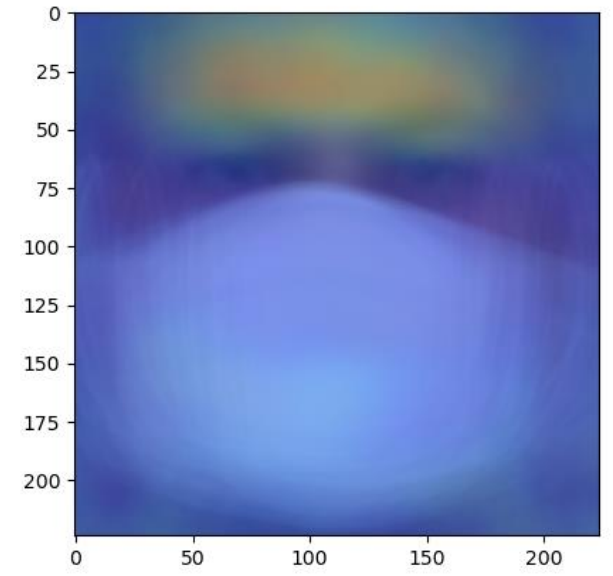
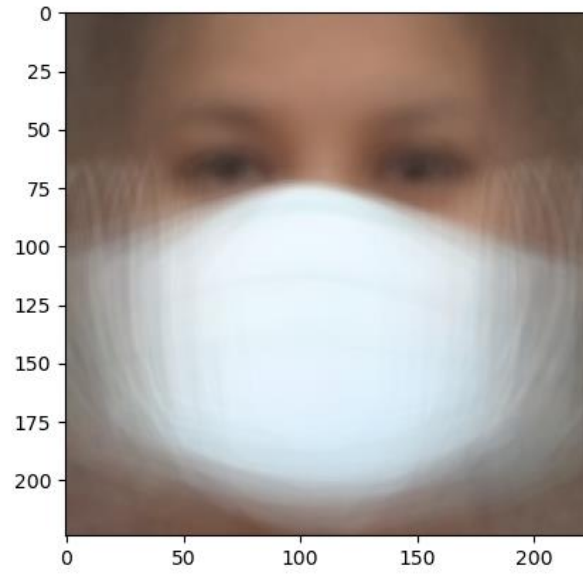
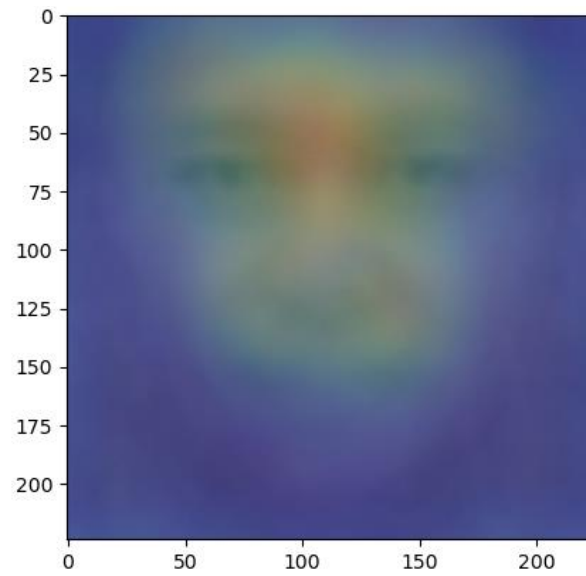
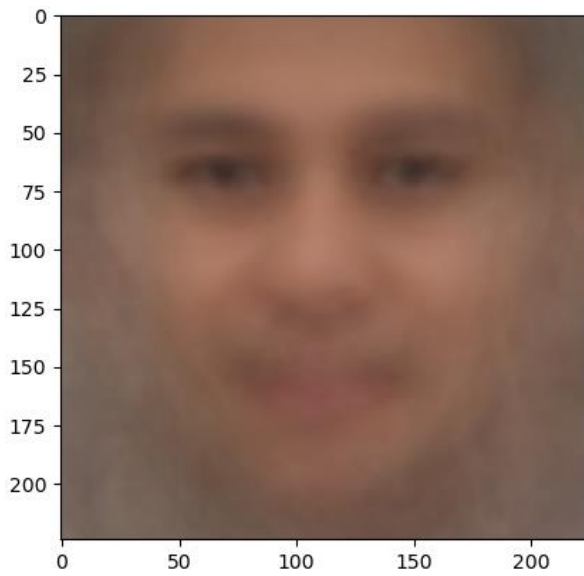
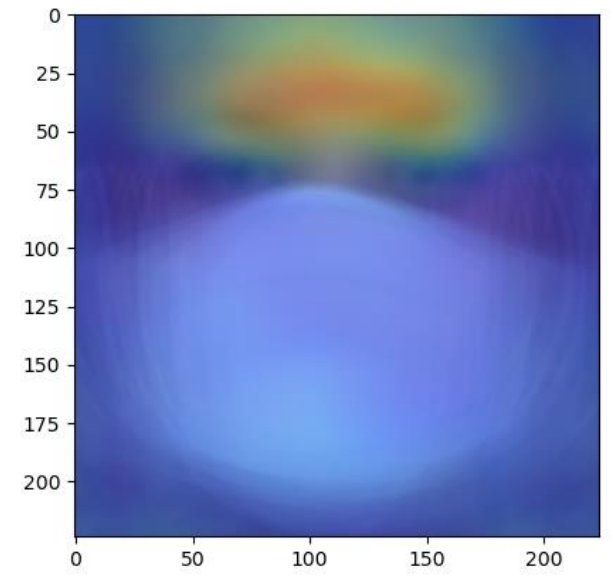
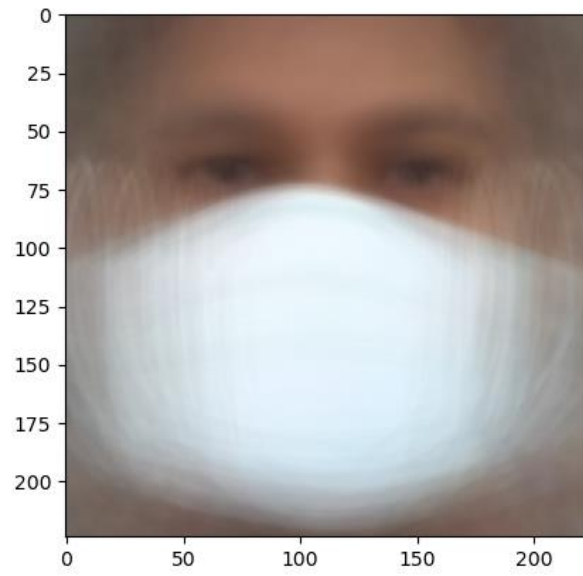
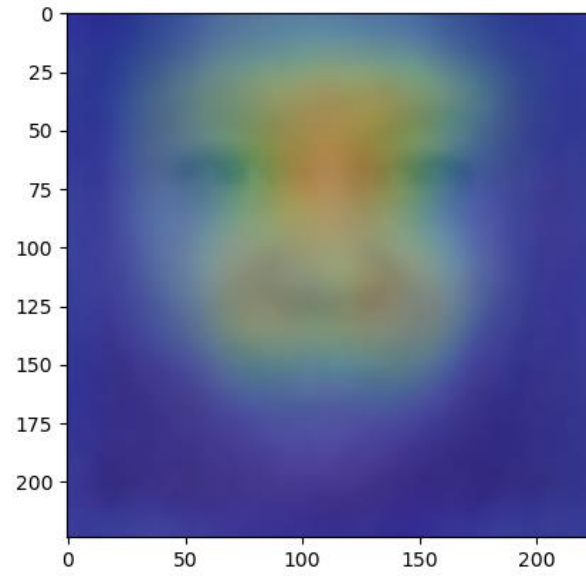
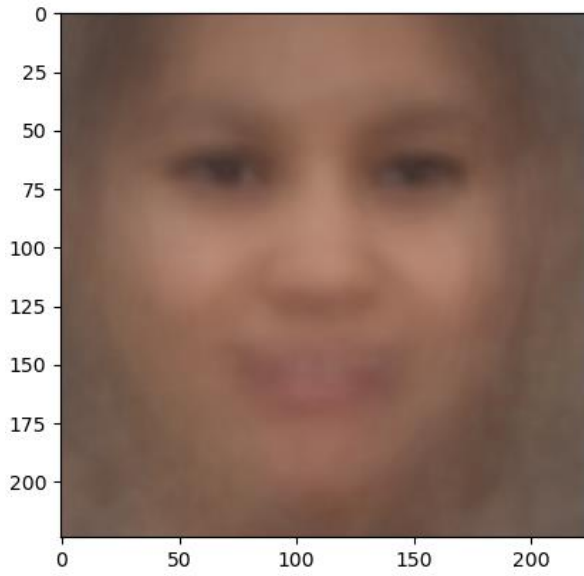


Male



Female

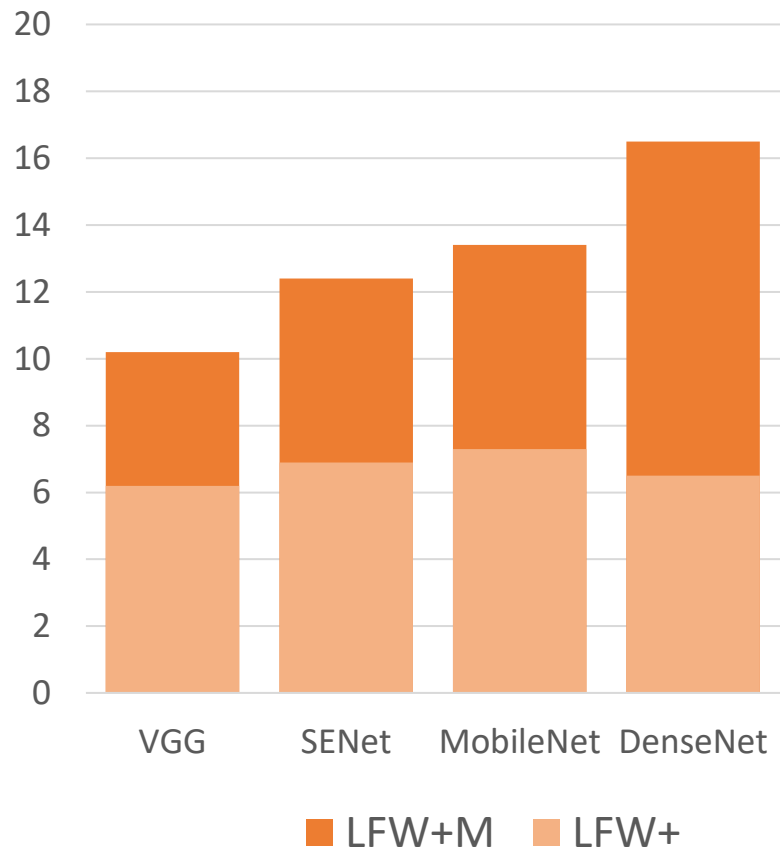
Results



Results



AGE Mean Absolute Error



Harder task

- Architecture dependent
- 4~10 years drop



0-15



16-20



21-30



31-45



46-60

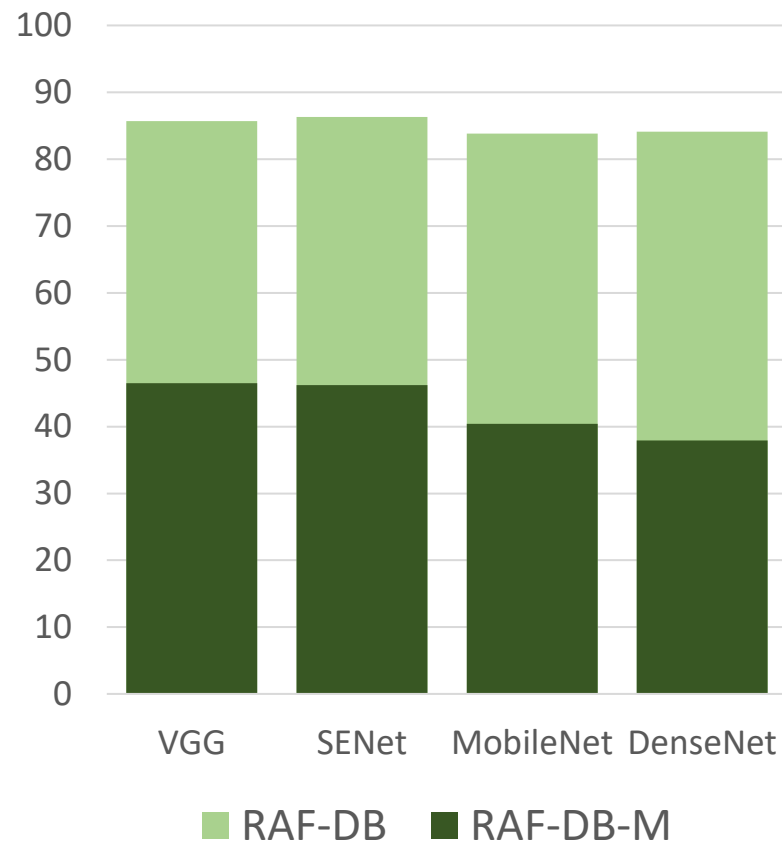


60+

Results



Emotion accuracy (7 classes, %)



- ~50% drop
- Network rely on mouth
 - Will training on partial faces work?



Anger



Disgust



Fear



Happiness

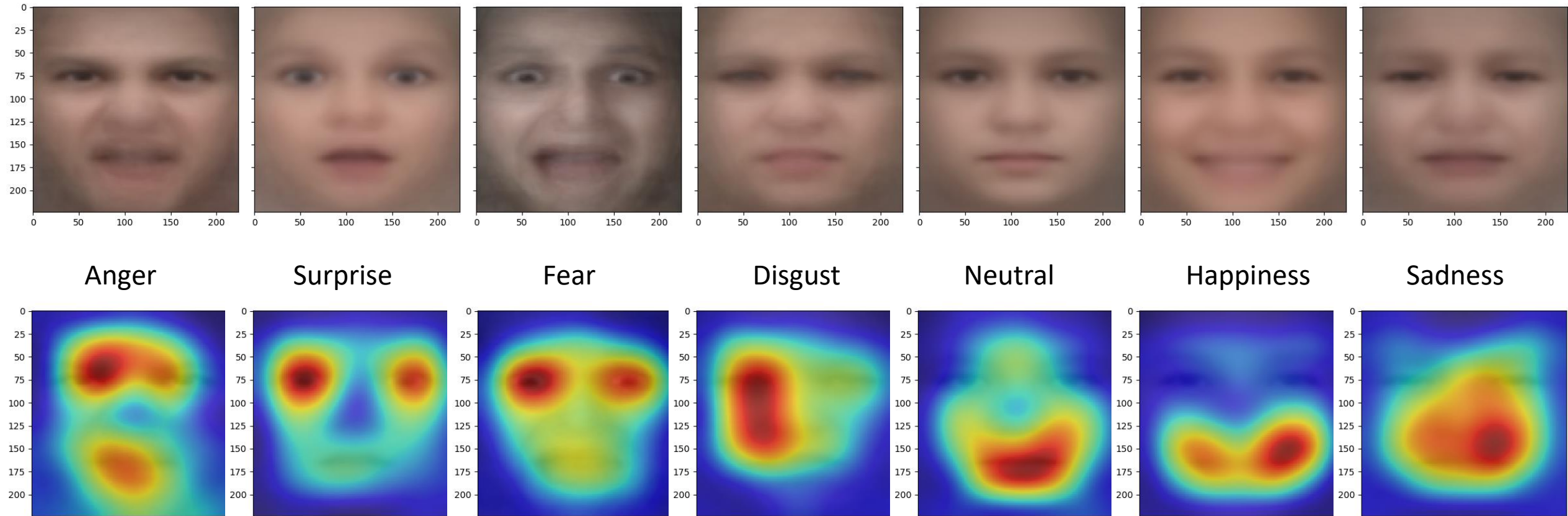


Sadness



Surprise

Results



- Summary:
 - Gender, ethnicity: ok
 - Age: possibly ok, with some architectures
 - Emotion: not ok
- Future direction
 - Training on masked faces? Training on partial faces?
 - Novel architectures resilient to severe occlusions

Thanks for your attention!
Any questions?

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Research partially supported by the Italian MIUR within PRIN 2017 grants, Projects Grants iMALL; partially supported by A.I. Tech-srl