



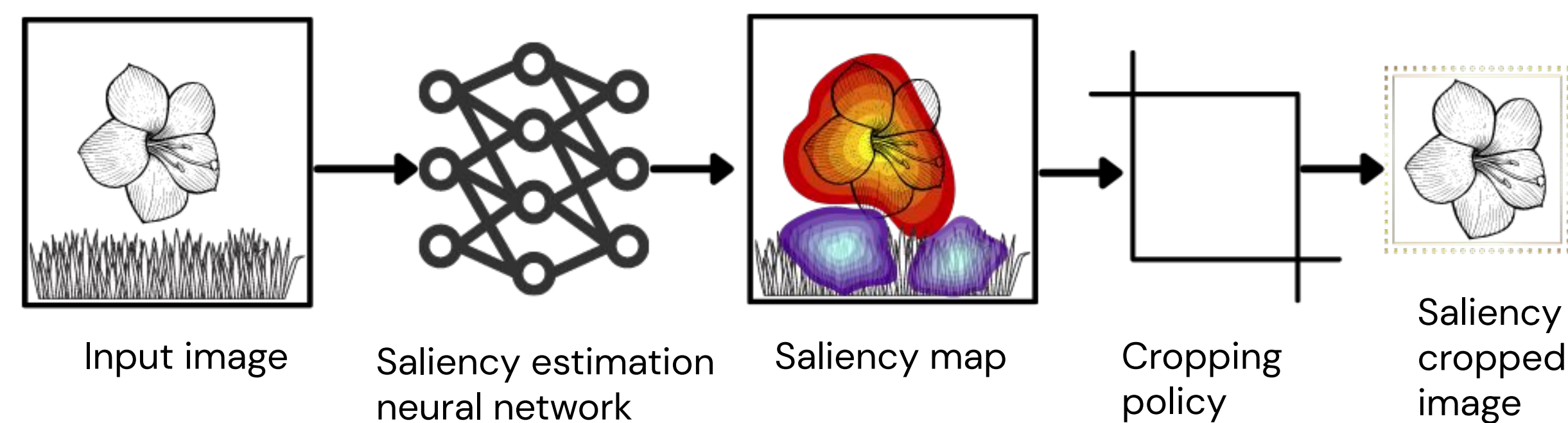
Auditing saliency cropping algorithms

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Abstract

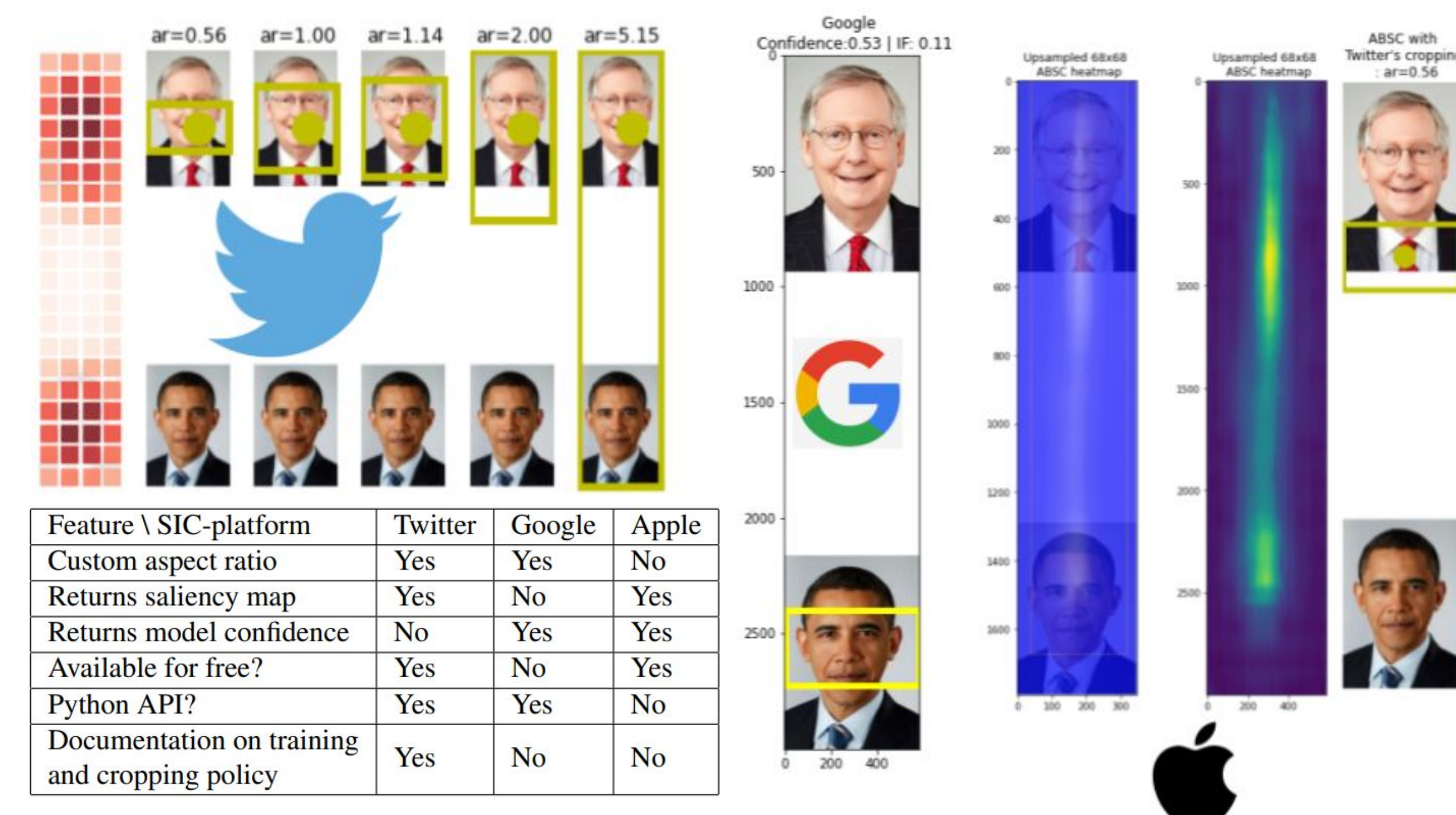
In this paper, we audit saliency cropping algorithms used by **Twitter**, **Google** and **Apple** to investigate issues pertaining to the male-gaze cropping phenomenon as well as race-gender biases that emerge in post-cropping survival ratios of face-images constituting 3 × 1 grid images. In doing so, we present the first formal empirical study which suggests that the worry of a male-gaze-like (MGL) image cropping phenomenon on Twitter is not at all far-fetched and it does occur with worryingly high prevalence rates in real-world full-body single-female-subject images shot with logo-littered backdrops. We uncover that while all three saliency cropping frameworks considered in this paper do exhibit acute racial and gender biases, Twitter's saliency cropping framework uniquely elicits high male-gaze cropping prevalence rates.



A typical saliency cropping pipeline

APIs audited

- We audited three saliency cropping frameworks in this paper: Twitter's Saliency Image Cropping framework, Google's crop-hints and Apple's Attention Based Saliency cropping

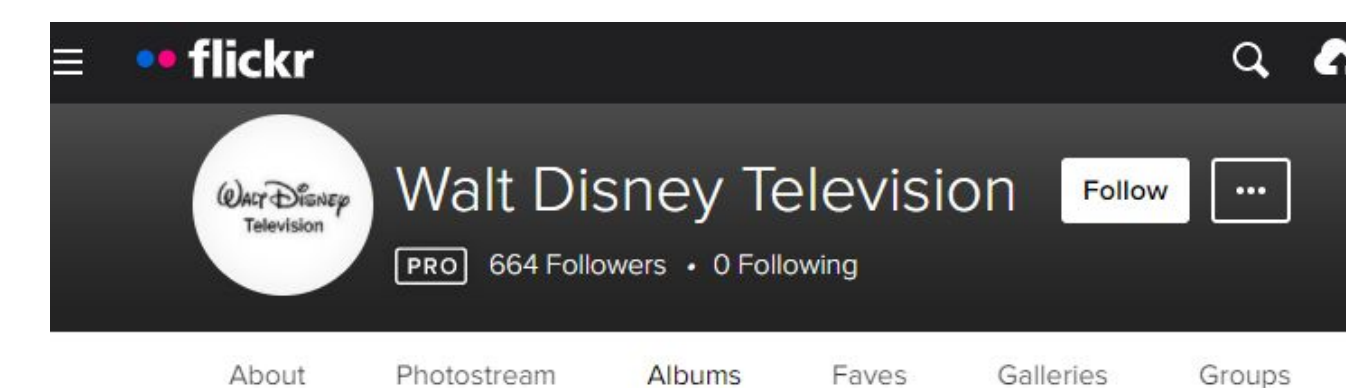
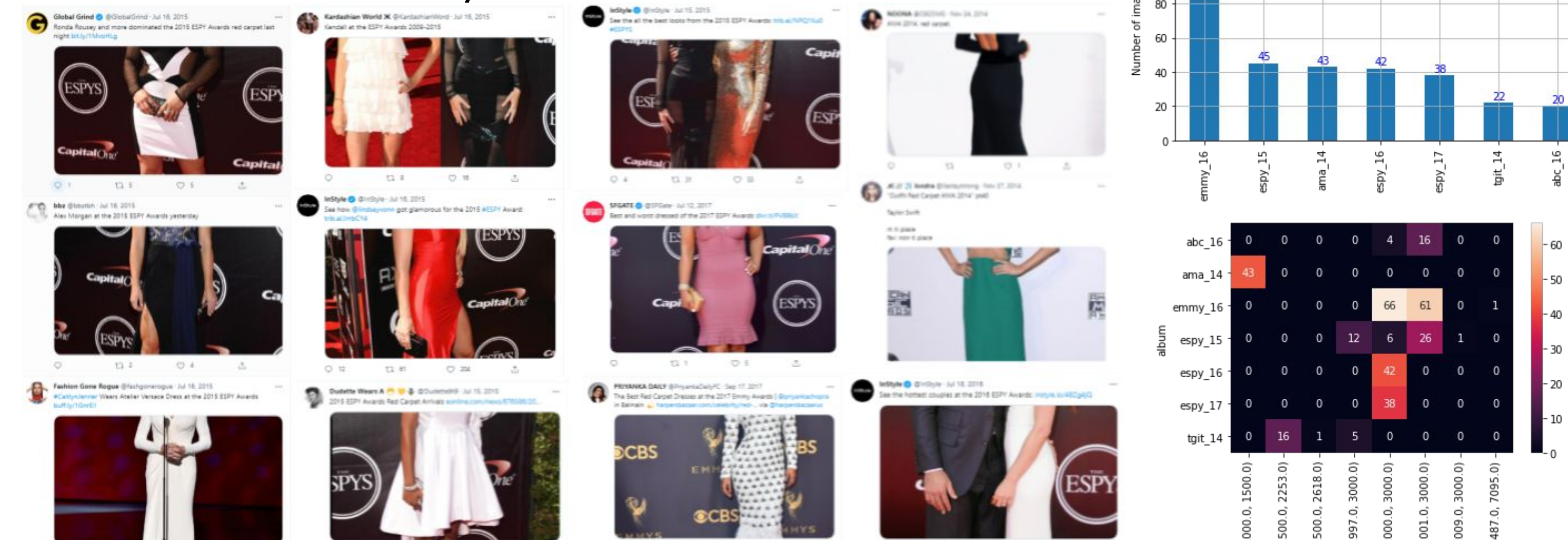


Feature \ SIC-platform	Twitter	Google	Apple
Custom aspect ratio	Yes	Yes	No
Returns saliency map	Yes	No	Yes
Returns model confidence	No	Yes	Yes
Available for free?	Yes	No	Yes
Python API?	Yes	Yes	No
Documentation on training and cropping policy	Yes	No	No

Analysis-1: Male-gaze in cropped images

"In a world ordered by sexual imbalance, pleasure in looking has been split between active/male and passive/female. The determining male gaze projects its phantasy on to the female form which is styled accordingly."

— Laura Mulvey, Visual And Other Pleasures

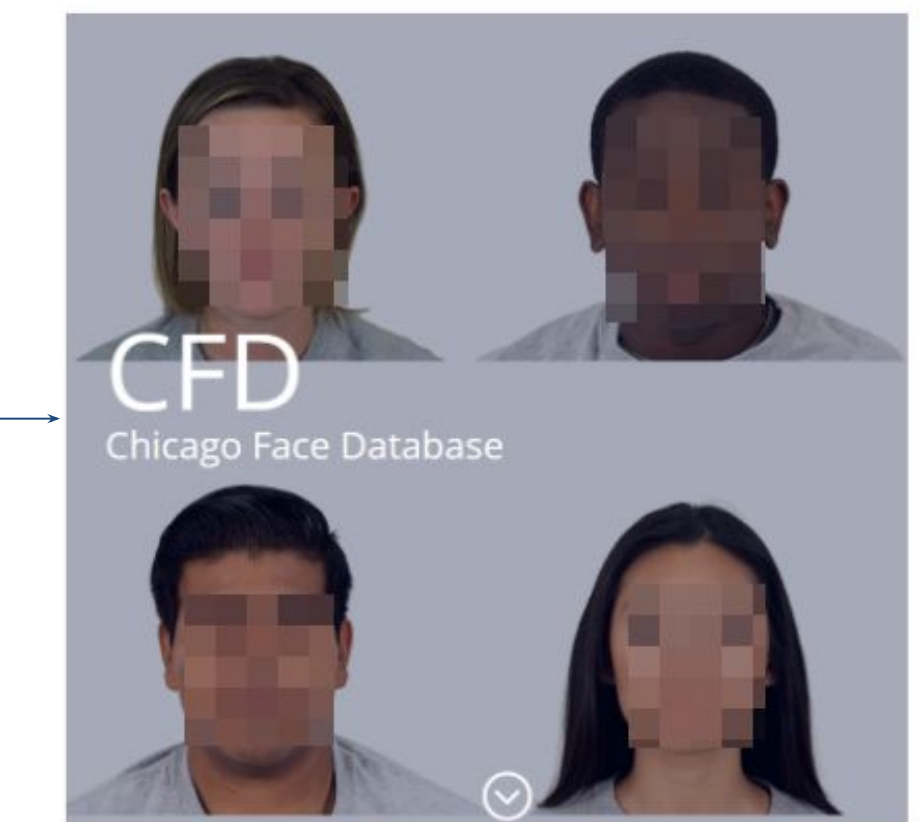


- a) **Size-ratio criterion:** The height-to-width ratio should be at least 1.25.
- b) **Full-body criterion:** The image should contain the subject's full body and should not have any MGL artifacts to begin with.
- c) **Consent criterion:** The image should be clearly shot in a public setting where it is ostensibly clear that the subject was consensually and consciously present to be photographed as part of a public event, and bereft of any voyeuristic artifacts.
- d) **Background constraint:** The image should contain a background littered with corporate and event logos.
- e) **Permissions criterion:** The image should be ethically viable to be subjected to our research plan from the point of view of frameworks such as Attribution-NoDerivs Generic license (CC BY-ND 2.0) that facilitates analyses with the attribution and noDerivatives constraints.

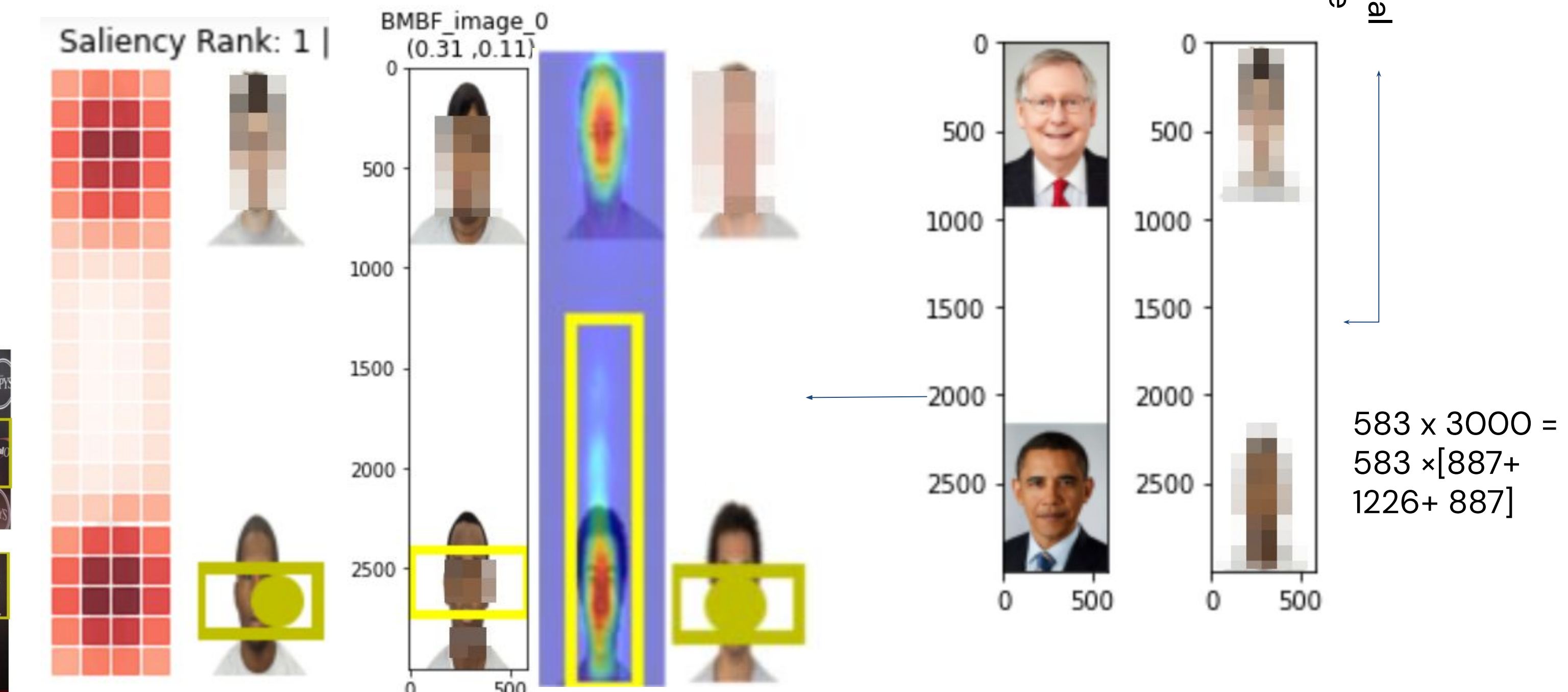
Album	Image-size	N_{images}	N_{MGL}	MGL-ratio
ABC-16	(2000, 3000)	20	5	0.25
AMA-14	(1000, 1500)	43	13	0.30
EMMY-16	(2000, 3000)	127	24	0.19
ESPY-15	(2000, 3000)	45	32	0.71
ESPY-16	(2000, 3000)	42	33	0.79
ESPY-17	(2000, 3000)	37	18	0.49
	(1500, 2250)	16		
TGIT-14	(2000, 3000)	5	13	0.59
	(1500, 2500)	1		
MGL-combined	-	336	138	(0.36, 0.46)

Analysis-2: Race and gender biases

wikidata-code	race	ethnicity
Q190168	black	Yoruba people: ethnic group of West Africa
Q49085	black	African Americans
Q127885	white	Serbs: nation and South Slavic ethnic group
Q42406	white	English people: nation and ethnic group
Q44806	white	Ukrainians: East Slavic ethnic group
Q539051	white	Greeks: people of southeastern Europe
Q678551	white	American Jews
Q726673	white	Swedish-speaking population of Finland
Q7325	white	Jewish
Q79797	white	Armenians: ethnic group native to the Armenia
Q179248	white	Albanians
Q2325516	white	Armenian American



Controlled for factors such as background, saturation, size, resolution, lighting conditions, facial expressions, clothing and eye gaze that might influence saliency



SIC platform	BMBF	BMWM	BMWF	BFWM	BFWF	WMWF
Twitter	BF: 269 BM: 231	WM: 294 BM: 206	WF: 448 BM: 52	BF: 256 WM: 244	WF: 409 BF: 91	WF: 351 WM: 149
Google	BM: 294 BF: 120 middle: 86	BM: 265 WM: 128 middle: 107	BM: 299 middle: 102 WF: 99	BF: 196 WM: 193 middle: 111	BF: 209 WF: 180 middle: 111	WM: 287 WF: 119 middle: 94
Apple	BF: 339, BM: 161	BM: 363 WM: 137	BM: 389 WF: 111	BF: 385, WM: 115	BF: 396 WF: 104	WM: 317 WF: 183

