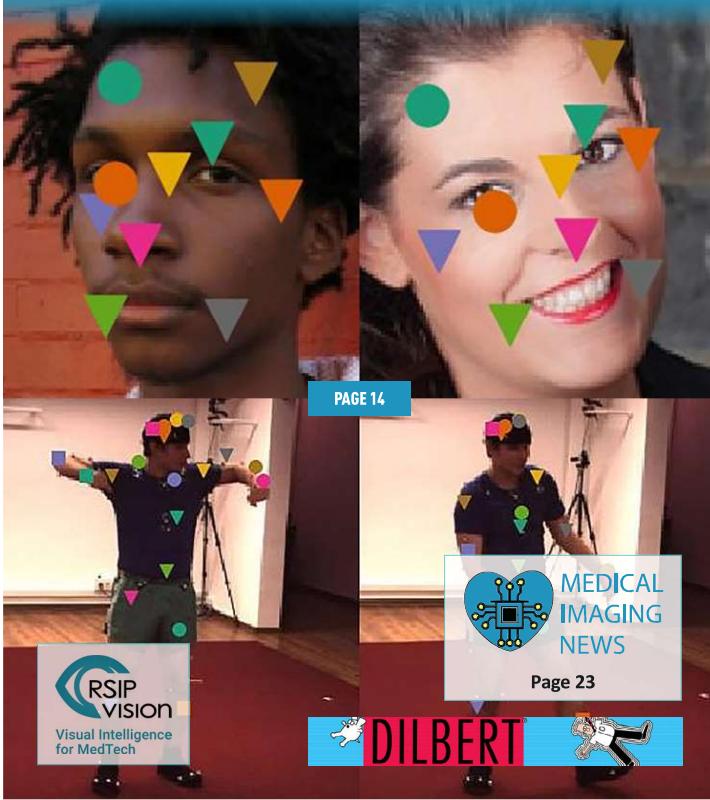


Computer Vision News

The Magazine of the Algorithm Community



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Auditing Saliency Cropping Algorithms

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Ethiopian-born Abeba is a cognitive scientist by training but says she has been drawn more and more to the computer vision side of AI. Her associates on this work, Vinay Uday Prabhu and John Whaley from UnifyID Labs, are two experts in computer vision.

"My work sits at the AI end of cognitive science," she tells us. "You can find all kinds of fascinating intersections between computer vision and cognitive science. Within this research, I'm particularly interested in how vision models present intelligence, emotion, or interestingness."

The first the team knew that platforms such as Twitter use saliency cropping algorithms was when an image of US Senator Mitch McConnell and former President Obama went viral for all the wrong reasons. A Twitter user put photos of the pair at either end of a blank image

to see which element the algorithm chose to present when cropped. It favoured McConnell almost every time.

"Many people don't realise these kinds of algorithms are created and deployed almost everywhere in these big social media and technology companies," Abeba warns. "Even within vision research, people don't know about it, because it's kept quiet, and the code and data aren't open access. It's difficult to carry out this kind of work because most of the datasets are protected by proprietary rights."

The team carried out two experiments. The first was on the male-gaze-like artifacts.

"We created a Twitter account and put images through the platform to see what came out," Abeba explains. "We kept noticing when images of women on the red carpet at the Emmy Awards, for



A collage of real-world user-uploaded images on Twitter that exhibited male-gaze-like artifacts



AUDITING SALIENCY CROPPING ALGORITHMS

Abeba Birhane just completed her PhD in Cognitive Science at the School of Computer Science, University College Dublin & Lero. Last month, she presented a paper at WACV 2022 in Hawaii, marking the first audit of saliency cropping algorithms carried out on three major tech platforms:

Twitter, Apple, and Google.

She speaks to us about this important and timely work.

In this work, Abeba collaborated with computer vision researchers to carry out a number of experiments to test male-gaze-like artifacts and racial bias in cropped images on Twitter, Apple and Google.



example, were passed through Twitter's saliency cropping algorithms, it was cropping them in a way that was focused below the chest and above the knee. This is what experts term the male gaze. It's that part of a woman's body which tends to be objectified."

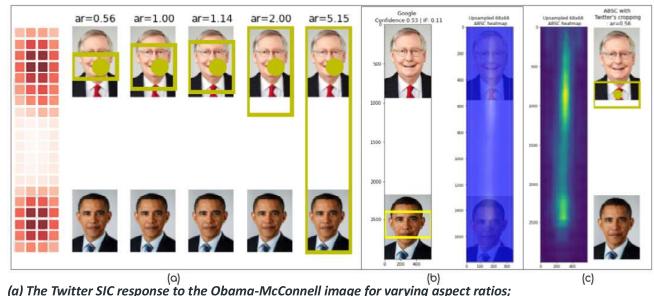
The team curated its own dataset of 336 images of women at red carpet events and passed each image through the three cropping algorithms of Twitter, Apple, and Google. For Twitter in particular, as many as 79% of the images came out with a male-gaze-like crop.

The team also observed racial bias in the results, similar to the viral Obama-McConnell results. Based on that observation, they ran a second experiment.

"We used the Chicago Face Database, with pre-labeled images for race and gender," Abeba tells us. "We created the same 3 x 1 grid images and passed those through the three platforms again. Google's result was inconclusive in that 20% of the time it was just selecting the white space. Other times it selected the black face and other times the white face. But with Apple and Twitter, we found the algorithm preferred white faces over black faces."

Part of the team's motivation for carrying out this work is that these cropping algorithms exist and impact us every day. It is very likely images we upload, or images we encounter when using our phones and computers have been through them.

Abeba looked at the reasons why companies and vision researchers use



(a) The Twitter SIC response to the Obama-McConnell image for varying aspect ratios;
(b) The Google CROP_HINTS response to the Obama-McConnell image;
(c) The Apple ABSC response to the Obama-McConnell image.

cropping algorithms in the first place and found no consistency in the responses

"Some of reasons were even contradictory," she noted. "There's no scientifically grounded reason for creating and deploying cropping algorithms on major platforms because they're all over the place and the science is very shaky."

Twitter carried out its own audit and published a paper just before the team released a version of this work last year which was accepted to the **BeyondFairCV workshop at CVPR 2021**. It claims to have stopped using the algorithm on its platform. Abeba says that remains to be tested but recognizes Twitter is an exemplar overall because they are doing the required work, while companies like Apple, Google, and Facebook are still a closed book.

"It's encouraging Twitter have opened up the data, but they haven't answered many questions about the data," she argues. "It's great they're carrying out their own audits, but it's important to let external auditors look at their code and algorithms. We need greater transparency. Maybe regulation is needed too to open source these algorithms. Our work marks the first audit work, but there is so much more left to do."

We asked co-author (and old friend of the magazine) **Vinay Prabhu** to say a word

about the computer vision work done for this research and he told us that the team has made the MGL-336 test-set accessible [here](#).

*"We are excited to see how the researchers working on saliency estimation and saliency cropping in the computer vision community will utilize this test-set in their academic explorations", he added. "Besides this, during the course of **WACV 2022**, we received plentiful feedback from computer vision researchers hailing from the two worlds of saliency research and we have summarized the resultant ideas and future directions of research on my [github](#). We are hopeful that the computer vision community at large will take some interest into these exciting leads."*

Abeba says her research is interdisciplinary, ranging from the study of cognition to constructing cognitive models. More recently, she has been exploring audit work, auditing large image, text, and multimodal datasets.

"I'm getting more and more into auditing datasets, but this is not by choice, it's more borne out of frustration!" she reveals. "With AI, because there's so much focus on producing the flashiest state-of-the-art models, people tend to ignore the datasets underlying these models. But they're crucial in how accurate and how well your model performs."