

# "Terminal Face": *De-centering whiteness* as approach to decolonize AI and Machine Learning

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## ABSTRACT

This paper presents the digital artwork/propositional design artefact "**Terminal Face**" (TF) and its diegetic affordances in (1) prototyping decolonized software (2) *from within the white-western medium*.

We firmly reject the notion that any decolonizing can take place without a plurality of stakeholders, however what we are exploring in this work is an attempt of *decentering-whiteness-as-default in software*. Given the absence of diversity in sites of code-instantiation we explore the production of actively *anti-racist code* through mitigating its bias(es).

This work is an account of our effort to circumnavigate computational Eurocentric-bias(es) through de-centering the privileged position of white ethnicities in AI/ML. TF's proposed value is the exploration of user-identifiable skin-types and what we will call "*meeting the code half-way*" as alternative/supplementary pathways to code-justice. We document the context of emergence, technical considerations, reflections and implications of our design process and rationale.

## Author Keywords

Creative Computing, Critical Computing, Art as research, Anti-Racist Computing, Decolonial Computing, De-centering whiteness

## CCS Concepts

•Computing methodologies → Philosophical/theoretical foundations of artificial intelligence; Machine learning;  
•Applied computing → Arts and humanities;

## INTRODUCTION

Instances of *racist AI* are ubiquitous and well documented within the scholastic medium, the global press and on public social media alike. These instances of racism are in no way limited to subject of *face detection* but also manifest in bias in ML facilitated candidate triage during the recruitment process [21, 22, 30], unequal pricing of cost of insurance [3], and biometric bias [16, 28].

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Whilst a single webcam's anti-dark-skin bias can potentially be considered humorous and amusing for a moment [6] the increasing scale of deployment of AI; its endowment with the greater powers and responsibilities; and the large-scale deployment at industrial scale(s) makes the topic of inherent *AI/ML bias* deeply concerning. Certainly in the backdrop of 2020 and an increasing public discussion of technologies such as predictive policing [15, 19, 26], leaves no doubt that the issues of *social justice*, *code justice*, *design justice* and *software engineering* are inseparably interwoven.

TF is an attempt to explore and retrace the instantiating of racist AI and explore new/supplementary racism-mitigation strategies emerging at the intersection of creative computing, research and activism. The tool/piece, portrays the observers face onto the command prompt in the form of ASCII text through the use of AI/ML facial detection. We sought to investigate if it is possible to mitigate inert racism of excising software and how this could be achieved. A central premise of the tool is that we removed any assumptions and expectations about skin-tones in the face-detection tools we used. This is the result of a set of forensic experiments with the AI we utilised to gauge the extent and type of racial bias it entails and these could be countered.

## WHERE THE RACISM EMERGES IN THE CODE

A premise of this work is the assumption that the emergence of racist AI is seldom the result of malice and intent, but the cumulative product of oversight, systematic underrepresentation of ethnic minorities, a lack of ethnic diversity in code-authoring positions, insufficient and inadequate training on part of software engineers and socio-economic and cultural bias. Whilst there are documented instances of actively racist and maleficent code-artefacts and authors [12, 20, 27] our work centers on *the inadvertent production of racism* through code.

This stance is informed by our engagement with the works of the political scientist and philosopher Hannah Arendt [1, 2] and her work on *the production and instantiating of Evil*. Her analytic review of the horrors of the German NS regime dissects the horrors committed by the Nazis, but Arendt's investigation stresses the central role micro-decisions and negligences play in the production of great Evil. Arendt's philosophy of Evil is one that is instantiated by (1) *thoughtlessness* (i.e. the product of an absence of responsible acting and ethical agendas) and (2) *banality* (i.e. through a vast amount of mundanely enacted deeds and trivial practises).

Cascade	frontal_face_default	frontal_face_alt_tree	frontface_alt	frontface_alt2	profileface	eye	lefteye_2splits	righteye_2splits
Expected	1	1	1	1	1	2	1	1

Table 1. Expected values of Haar detection results.

## QUERIES FOR FORENSIC CODE REVIEW

We undertook this forensic analysis of existing AI/ML modules sourced from the open realm. After querying “*face detection python*” in Google, all of the results either relied on the `face_recognition` library, or OpenCV’s default Haar feature-based cascade classifiers [31]. The popular `face_recognition` library, is based on a network that is pre-trained on unchecked public image datasets. Such an uneven distribution of people/ethnicities leads to facial recognition that, by the library author’s admission, “works well with European individuals, but [its] overall accuracy is lower with Asian [and non-European] individuals”.<sup>1</sup> Due to this inherent bias, we abandoned this library and sought alternatives for our software. Regarding the results containing Haar feature based classifiers, a recent study suggests that the technique cannot be positioned as a universal face detector, since it fails to identify Black faces at a notable rate [29]. Moreover, the study found the most accurately detected class to be the White-Caucasian males. Indeed, if this was consistent with OpenCV’s default, pretrained cascades, we would also have to reject this approach for its implicit racism and White-centrism. We tested the inert bias through repeating their experiment to confirm if this would be the case for OpenCV’s cascade files.

### Experimental Results I

The *Fairface* dataset is an existing repository of photos which are carefully taxonomised equally into seven racial categories [14]. For our study, two samples of 7000 and 5000 images of faces, labelled and balanced across five races (three Asian classes for Fairface were averaged), were compiled from the *Fairface* [ibid.] and *UTKFace* datasets, respectively. Each image was applied to eight OpenCV cascades in which they would accumulate errors at each stage (See Table 1). We then calculated the mean classification error for each race (See Table 2). The results consistently yielded a higher error for images depicting faces of Black people, being detected wrongly on average 31.2% more than other races/ethnicities. Unexpectedly however, the data did not reflect a bias towards White faces as the original study suggested - with images displaying Asian people being the most accurately detected (error 16.7% below mean) whilst the error rate for White faces was 4.77% (above mean). Due to such a significant average detection error for Black faces, we rejected using OpenCV’s default Haar cascades.

### Query II

With the results from *Query I* confirming racial bias, we begun our trials to mitigate these effects. We noted that all of the articles returned from the new query, “*skin detection python*”, that

<sup>1</sup>[https://github.com/ageitgey/face\\_recognition](https://github.com/ageitgey/face_recognition)

	White	Black	Asian	Indian	Others
UTKFace	1.65	2.39	1.07	1.21	1.24
FairFace	3.71	4.32	3.19	3.50	3.30

Table 2. Average detection error per racial group.

	White	Black	Asian	Indian	Others
HSV	28.7%	21.3%	19.0%	27.8%	24.9%
YCrCb	32.3%	23.5%	20.6%	29.6%	26.5%
HSV	25.0%	15.0%	15.9%	21.4%	21.0%
HSV	31.6%	20.8%	23.4%	30.3%	27.0%
YCrCb	29.4%	18.5%	19.8%	25.4%	24.0%

Table 3. Average pixel frequency of tones within bounds from first three articles per racial group.

did not feature aforementioned methods, were using colour based analysis in face detection. This involved localizing image pixels within a colour range, usually with respect to a HSV or YCrCb colour space. However, comparing each pixel to pre-determined upper and lower bounds were a deeply concerning approach/premise/assumption. *A priori* assumptions of skin tone in face detection tools make us extremely uncomfortable. In this instance, we challenged these ranges using the FairFace [14] dataset.

### Experimental Results II

Sampling the whole dataset across the HSV and YCrCb bounds from the top three Google search results, we found that White faces were consistently favoured over other ethnicities (see Table 3). On average, White skin tones were detected 22.0% more frequently than the mean, and 42.7% more than Black skin tones - which were found 14.5% less often than the mean. Asian faces suffered the poorest results, having a skin detection rate of 21.4% below the mean.

### Results and our Response

Following this, it became clear that in order to ensure the software became/remained anti-racist, we would have to avoid many of the assumptive solutions supplied by widely available tools. We adapted the colour range based technique to accept bounds configured by the user through a separate interface. Only after stripping the software down to this level, were we able to see more inclusive face detection. This suggested to us that in order to remain anti-racist, a developer must take on a more manual and hands-on approach.

Developers cannot uncritically rely on existing as default and must conduct extra steps until the resources currently available show anti-racist reform. Yet, rather than rejecting existing tools, this experiment sought to ‘find the racism’ (whilst firmly assuming that it possesses racial bias) and mitigate it.

Whilst we were unable to find articles which directly instructed an anti-racist approach through their code (by querying “*not racist face detection python*” for instance), better solutions to the problem exist. For example, through training a wholly representative Haar cascade classifier. Irrespectively, by taking into consideration the generalised nature of our Google searches, and the fact that most developers do not adopt anti-racist or decolonizing thinking practices in their work, the results are seriously worrying.

## RESPONSE: TF'S ARTISTIC-POLITICAL DIMENSION

*Development diary entry:*

*What should my default skin mask be for the application? Is it even fair to set one? My software could in no way be a comfortable space for encounters if I used 'a default skin tone'. For that reason I made considerable effort to ensure my software was as context-accommodating as possible.*

Aside of the forensic work described above, we understand **TF** also to have a substantial creative, artistic, activist and performative dimension: We will now discuss three key design rationales: (1) the choice of ASCII as representational modality of the user's face; (2) the traces our political and ethical motivations left in our UX/UI/presentation and (3) the use of the 'terminal' as canvas.

### ASCII

Instead of a photo-realistic approach to representing *the face*, we decided to display the AI/ML-identified user-image using ASCII text representation. This design choice is an explicit reference (and rejection) of Weiser's vision of *invisible UBI-COMP* [8]. **TF**'s aesthetic is an explicit revision and critique of these computing practices and traditions. **TF** sign-posts an alternative premise and shows us its benefits and values.

Weiser's vision of ubiquitous invisible computing futures, may be an attractive computational objective but its ephemerality simultaneously robs non-technologically literate communities/people from the ability to develop a stake in discussions of desirability/justice/fairness and hidden 'baggage' of technology. *Invisibility in tech* is not only a threshold of exclusion for non-computing literate people, it even prevents technology's mere perceptibility. *That which is invisible, or "black-boxed" is below our radar of perception and becomes unavailable for critique.* 'Hidden tech' is more likely to remain unchallenged.

**TF** intends to be explicit about its computational agency in a clear and noticeable manner: The strong visual imprint of ASCII is an explicit appeal to render our curatorial coding-impact explicit and tangible to users.

### Intersectional inclusivity

We make the point that inclusivity without substantial and visible change to foundational conceptions of 'what makes desirable computing' is an inherent contradiction. **Postcolonial/ decolonized/ inclusive computing technologies will look/ feel/ be different.** **TF** wants to be explicit about this.

**TF** invites/fosters discussions about *what is successful and desirable (in) computing*. Any genuine attempt at *intersectionality*<sup>2</sup> in computing computing demands a (re-)evaluation of re-evaluation of priorities the making of visible and substantive changes explicit action. It requires "time, resources, people, money and the sharing of power and responsibility" [manuscript by Brueggemann].

### Terminal

Finally we want to discuss our choice to use the terminal as canvas for our artwork. Decision is intended to signpost the conditional entanglement of software, users, representation, and code in-justice.

<sup>2</sup>(Kimberlé Crenshaw [7])

Whilst in software engineering the subject of UI user interface and OS/buttrressing software are conventionally considered to be wholly separate fields, our work seeks to stress that this siloification [10] in computing is a firm part of *the problem* (see also our closing remarks).

We commenced our paper with the point that the systemic disenfranchisement of subaltern communities is an issues that goes far beyond computing, yet at the same time computing is a firm part of its instantiating (and equally so plays a role in its mitigation/solution).

The terminal (as symbol/metaphor of computing's hidden architectures[34]) is a central space requiring decolonization; and until marginalised communities form part-and-parcel of those communities who are "digiscape architects"<sup>3</sup>[5]. Mere UX and UI concessions/modifications do not address the depth of underlying problem(s) of *whiteness as default*.

## REFLECTIONS

We want to conclude our paper with some considerations on the discipline and practises of HCI-at-large. We want to stress again that the issue is simultaneously *far beyond the 'pay-grade'* of HCI, but also at the same time is very much *at heart of it*. Technology (here signposted through *the terminal*) is anything but 'neutral'; it embodies values, politics and re-iterates structural biases and enacts *whiteness's default position*. Yet at the same time, *the digital* also possesses firm and desirable decolonizing affordances [4, 9, 17, 23, 33]. Yet, these often are the result of indigenous creativity and/or non-intended subversions of technology *from the bottom up*. We appeal for pluriversity through an active pursuit of anti-racist coding practises and processes deployed in HCI-at-large.

Whilst the political-artistic symbolism embodies greater political aspirations of our work, *explicit anti-racist fingerprint in our coding* is the active and encrypted removal of *white skin being default*. We are therefore proposing a type of *dialectic software* that is *modest in its universalism* by being iterative and context-amenable (future research on this impending).

We are not advocating for the abandonment of the principles of *participatory design* but are exploring with this early work new avenues to *decolonize computing* from within. From within hereby refers to "from within computer science" but also "from within the code".

Decentering whiteness - we propose - must become an active part and parcel of the premises of future software engineering; and this AI/ML intervention outlines our first visions for this practise. Inclusive software (we conclude) need not *merely be of participatory elicitation*, it must be actively anti-racist.

Based on the work of techno-philosopher Haraway [11] we refer to this as a practise of as *encoded modesty*. Their work will further explore and outline the principles *modest design* and its implication for participatory innovation with/for those who are less considered in the development of tech.

We do not consider our approach to be *yet another premise on behalf of PoC* as our design premise was not to amplify the

<sup>3</sup>A pun on the term "landscape architects" and "urban architects"

voices of all/those ethnic minorities (especially those of which we are not part of); our premise was explicitly one of actively decentering and mitigating the re-enacted privileged position of [default] *whiteness in anticipated users*.

Our attempt here was to surrender some of the sovereignty over the code explicitly (and easily) to the prospective user. In this sense we sought to produce a type of "open-ended code-artefact" that could become "embedded" to the user's context. We wanted to enable our users *to meet the code half-way* - i.e. give agency over our code to the end user, and challenge the black-boxedness of AI/ML tools. We do not propose that *meeting the code half-way* is a universal solution; but we consider it a supplementary path worth exploring in the overall project to decolonise. We hold that surrendering authority and the sharing of power over digital artefacts is a necessary step in decolonizing.

We finally want to conclude with some remarks not only about the practises of coding and SC, but also the venue and discipline of HCI. These are sites that firmly require decolonialisation too.

## FUTURE WORK

As for the remit of this project in the context of future work (by either us or others) we consider the following avenues as distinctly promising research avenues:

(1) One future research avenue we are intending to explore is to continue and deepen our ongoing exploration of the work of Hannah Arendt for further lessons from her exploration of *the cruelty of the filing cabinet* [18].

(2) We further consider this work to make a strong case for the synergies of philosophical writing and applied computing and design theory. *Coding at this intersection* that draws firmly on all these literatures is an imperative need, and which will benefit research in the Computer Sciences, Design (practise and theory) and scholastic Philosophies alike.

(3) Alternatively we anticipate that a study which extrapolates our design provocations and conclusions and scopes them for their applicability for large(r) AI/ML projects. We anticipate that this could be an exciting and insightful study to conduct. In the same way that our code-review was a firmly instructive analysis, conducted with a firmly committed anti-racist agenda, the same lens may be instructive in revising existing large(r)-scale digital infrastructures.

(4) In our own work we explore in more depth our proposed concept of '*meeting the code half-way*' (a current ongoing project).

(5) A final exciting avenue for future work based on **TF** could be an exploration how our lessons on facial detection could be *re-mobilized* for other AI/ML systems.

We believe that all these pathways are worth-wile options to pursue and are excited to continue this conversation with our dear colleagues at the 2021 CHI workshop: *Decolonizing Design Practices: Towards Pluriversality*.

## FINAL IMPORTANT REMARKS

The network of agents and (infra)structures that support *code* such as institutions, practices, policy, training, governance, cost, hardware, formal university education, training manuals, language (etc) reenact racial/colonial bias. The same is true for inequities in matters of gender, ability, neuro-divergence, religious prejudice and disenfranchisement, ageism, cultural alienation, the dominance of the English language medium - and many many more. Decolonizing and *intersectional computing* must consider these issues too.

We hold true that as Brueggemann puts it "[All] *Innovation is at its most powerful and exciting when it is not a means to its own end, but when progress is put into service of a greater project of social justice and emancipation.*" [5].

The discipline of HCI and its institutions necessitates decolonialisation too. We want to refer to a contribution by Brueggemann to CHI 2021 [5]. In said protest-piece, the author commits to a regime of *intersectional academic citing*. There, this is enacted by only citing Black scholars, PoC and/or authors from otherwise marginalised communities. The production of that article took substantially longer, required more diligence and authorial creativity and networking on the part of the writer.

Yet, we firmly assert that an overall more inclusive literature and plurality in research is an imperative part of decolonizing HCI, computing and its practises.

This project, in many ways, held a cybernetic mirror to our discipline(s) and whilst it told us much about computing, the work was equally so instructive about our own positionality.

## STAYING WITH THE TROUBLE

We acknowledge that this workshop on *Decolonizing Design Practices: Towards Pluriversality* is taking place as part of the overall CHI 2021 conference.

It appears that the ACM will award its greatest honours (the *Turing Award*) to a recipient with a history of making deeply concerning statements. Yet, ACM nonetheless insists that it is increasingly committed to "diversity and inclusion". It remains unclear how such support ought to look like if ACM follows through on its plans to award its prize in this manner.

Furthermore, this conference is now - for the second year in a row - not only taking place *during* the Holy Month of Ramadan, but this year in fact *collides with the festivities and observances* of Laylat al-Qadr and Eid al-Fitr.

As the excellent Dr Sara Nabil<sup>4</sup> pointed out, Muslims make up approximately 1.8 billion people i.e. approximately 25% of the global population. The brilliant Dr Caglar Yildirim<sup>5</sup> added that this clash is scheduled to be repeated for CHI 2022 and CHI 2023 (at least at the moment of writing). In the backdrop of these grave oversights on part of the conference organisers we close our case for the need of (1) a holistic and context-committed overall-project of decolonized computing and (2) *an imperative for pluriversality in innovation*.

<sup>4</sup> Author of/collaborator in [25, 24, 13].

<sup>5</sup> Sole author of [32].

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