Seeing as Un/Making – Photogrammetry as a techno-feminist practice of counter-mapping
Dr Dave Loder

The evolution of cartographic practices arrives in the 21st century where the capacity to observe and experience the world resides within our pockets on a digital screen. Through the colonisation of the globe by the European nations during the 600 or so years preceding this point, cartography has honed its practice, deployed as a tool of dispossession, alienation, and resource extraction, of bodies, territory, and physical materials. Today, ever more advanced technologies are developed to observe and capture space and objects, with digital scanning and mapping techniques having the capacity to reproduce regimes of power and control embedded under a colonialist cartography, to manifest representations of the world rooted with bias and inequality. This paper takes as a focus one contemporary digital practice, that of photogrammetry, and investigates the potential frameworks of digital colonialism and systems of exclusion and extractivism which underpin its disposition. Through the reading of artist projects which use photogrammetry as a critical practice, this research proposes strategies for a techno-feminist re-appropriation of the technology and a category of "counter-mapping" (Peluso 1995) to resist the structures of power and inequality implemented under digital extractivism.

[SLIDE – Google Earth]

Photogrammetry is the digital process of constructing photorealistic 3d models from visual information extracted from 2d images. The most familiar deployment of this technique would probably be via Google Earth and the cartographic construction of realistic 3d environments, made possible via satellite images and aerial photography. Photogrammetry takes datasets of images, which can be both discontiguous sets of images and linear image

sequences from video footage, to use a machine learning process called 'Structure from Motion' that matches overlapping content in the images for reconstruction in 3d, with larger datasets with more overlaps creating more accurate models.

A digital technique with a wide range of applications, key to this research is the adoption of photogrammetry by archaeology and heritage visualisation. In these contexts, photogrammetry has been heralded for its capacity to digitally preserve artefacts under threat and give new audiences access to cultural experiences via digital 'twins'. However, such practices are not without controversy, with arguments that photogrammetry is insufficient in its claims of authenticity, but more significant are assertions that photogrammetry enacts and sustains regimes of digital colonialism (Khunti 2018) and capitalist extractivism (Loder 2021).

[SLIDE – Palmyra Arch replica]

Of note is the replica of the Roman-era Arch of Triumph from the ruined city of Palmyra, Syria, erected in Trafalgar Square in London adjacent to the National Gallery in April 2016. With the original destroyed the previous year by terrorist group ISIL during its occupation of the city, this 1/3 scale reproduction fabricated using 3D printing technologies was commissioned by the Oxford-based Institute of Digital Archaeology (IDA) (IDA 2020). The digital modelling of the original arch was the outcome of a photogrammetry endeavour, using a dataset that was crowd-sourced, with the IDA issuing a global call for photography taken of the arch prior to its destruction, mainly submitted as privately owned images.

As the replica arch was exhibited in several cities across the globe, it was championed for its heritage benefits, but also its resistance to the iconoclastic ideology of ISIL in the destruction of monuments and arguably the Global West's neoliberal agenda of cultural consumption. But the project is not without criticism, including a focus on the shortcomings of authenticity of the reproduction. This is not only in terms of the one-third scale, but due to the insufficiencies of the photogrammetry process, or more precisely, the lack of consistency in the composition of the dataset. Many images would have been low quality

holiday snaps that did not provide a full and complete documentation of the historical site, resulting in many of details of the original monument being distorted or absent.

[SLIDE – Replica arch details]

In addition to these digital variances are the ethics of data ownership. Coordinated by the digital platform Arc/k Project, the harvested crowd-sourced images for the dataset were submitted under Creative Commons license, and gave necessary permission to 'redistribute, remix and transform the [source] material'. However, control over the patent for the final digital model was retained by the IDA, despite the democratised means by which the data-set was secured, with the replica cited as an expression of 'digital colonialism' by some (Khunti 2018, Kwet 2019). In this context, the technologically advanced outsider has extractively seized the cultural heritage from Syria and prohibited future rights of access. However, a more expansive indictment would be of 'data colonialism', whereby digital subjects are dispossessed of and alienated from the data that they generate (Fraser 2019). Arguably, those digital subjects who volunteered images for this extractivist event are complicit in their subjugation. Nonetheless, an attention towards the pantheon of technological platforms themselves is revealing of emergent practices of imae-based photogrammetric-enabled data colonialism.

[SLIDE – Facebook's F8 Developer Conference 2018]

For example, in 2018 former Facebook, now Meta, made public a project to utilise personal photos and videos uploaded by users to recreate in digital form the physical environment where the recordings were made (Franklin 2018). In this context, intimate spaces can be subjected to the extractivism of technology platforms with domestic interiors dispossessed from users and (re)produced for digital consumption by others.

These expanding digital practices by a range of corporate interests demonstrate the resource extraction enabled via photogrammetry, as applied to any site for which datasets of images can be requisitioned, either from existing databases and archives, for example Instagram and Flickr, or intentionally documenting the location, for example, via drone-

based aerial photography. While some activities may expedite genuine interests, many are subsumed in the machinations of tech companies that are less than transparent is how they use users' data. Nonetheless, the distinctiveness of photogrammetry as a tool of colonialism is the dispensation of dispossession at the intersection of fixed physical space and dispersed digital information, and an image-based cartographic praxis to which strategies of resistance are demanded, and practices of 'counter-mapping' are to be developed.

[SLIDE – 'Data: The New Black Gold']

To propose how the practice of photogrammetry can be re-appropriated in service of the oppressed, this research has engaged with the work of a number of creative practitioners, with this paper specifically focussing on the artist, architect and fashion designer Ibiye Camp. The first of two notable projects, 'Data: The New Black Gold' (2017) is contextualised by the historical infrastructure of European colonialism and the emerging data infrastructures in Sierra Leone and Nigeria that replicate the previous conditions of extractivism. The artist deploys photogrammetry in the spatial context of Malamah Thomas Street market in Freetown, Sierra Leone, between which Ibiye co-resides with London, and Balogun Market in Lagos, leading city in Niger's digital revolution. The second project is 'The Sacred Forests of Ethiopia' (2019), a collaboration with Emmy Bacharach and David Killingsworth, where photogrammetry is deployed in the unique church forests of Amahara state, sites of ecological intensity and religious Ethiopian Orthodox Christian practices which predate the European colonisation of Africa.

[SLIDE – 'Data: The New Black Gold']

In 'Data: The New Black Gold', the devices to capture images have been bestowed upon the market vendors, in a direct effort to empower "citizens [to] take control of their own data and what data is generated from their cities" (Camp nd.). The outcome is a film of collaged 3d digital modelling of the street markets and their occupants, overlaid with audio from field recordings. The film's editing gives contrast to the traditional market stalls, their groceries and other basic staples, against the presence of modern data infrastructure and prominent advertising of mobile phone services. The digital environments presented are

distinct in their amorphous and bloblike character, exhibiting the glitch aesthetics of incompleteness from inconsistent photogrammetric processing. Nonetheless, the fragmented digital territory presents a mapping of the markets according to the activities of those who inhabit it, a claiming of the right of access in refusal to state cartography. Furthermore, the glitch as an aesthetic and as referenced by Ibiye, is complicit to what has become an established canon of technologically articulated critical resistance, as championed by media artist Rosa Menkman and others (Menkman 2011).

[SLIDE - 'The Sacred Forests of Ethiopia']

The motivation for Ibiye's 'The Sacred Forests of Ethiopia' project is the exploration of the church forest itself as a system of resistance, where the sacred designation of the church has afforded protections to bordering woodlands in refusal to mass deforestation inflicted across Ethiopia. Exhibited as a field of 3d printed artefacts, the fragmented and distorted mapping of the forests "emphasise the incompleteness of the landscape […] where the digital elements in the installation were used to speculate the future expansion of the forest". In contrast to 'Data: The New Black Gold' that deploys the partial aesthetics of an indigenous photogrammetric documentation to perform the act of resistance, in 'The Sacred Forests of Ethiopia' the distinct aesthetics are used to enhance an already existing condition. These gaps and "shadows of information" (Young 2022) are embedded in extractivism's own tools, manifesting absences and voids which reject occupation by the technology itself. Instead, spaces emerge for inhabitation by those who deploy the tools to retain access to and control over indigenous resources, while simultaneously directing attention to the insufficiencies of the photogrammetry technology.

[SLIDE - Legacy Russell's 'Glitch Feminism', Donna Haraway's 'Cyborg Manifesto']

Ibiye gives reference to Legacy Russell's 'Glitch Feminism' when discussing her work, with broader feminist discourse concerning technology and its embedded bias and inequalities contributing further to the articulation of photogrammetry as a praxis of resistance and counter-mapping. In particular, the fragmentary and incomplete character of the 3d modelling can be contextualised by feminist writer Donna Haraway's pivotal 'Cyborg

Manifesto' (1991). Through this framework, the artefacts of extractivist production are partial objects resulting from "partial perspective" (Haraway 1988:583) and the materialisation of troubled boundaries of the hidden and the visible, the public and the private. Such thinking indicates the impossibility of a complete and singular epistemological structuring of the world, with refusal directed towards the assumptions and ideologies of a fixity and ideality proposed by a colonialist cartographic agenda. While the aesthetics of partiality are actively engaged in Ibiye's photogrammetry, they are unintentional but nonetheless present in the replica of Palmyra's arch, and pointedly defy the claims of authenticity and cultural value celebrated by its fabricators who epistemologically limit its access.

In addition, and as previously noted, their partial condition provides insight into the visuality of the machinic instrumentation, in abeyance of anthropocentric objectivity, and the significance of the apparatus in the construction of knowledge. Contextualised by material-semiotic practices, were meaning and material are co-constitutive conditions, physicist and feminist theorist Karen Barad defines the deployment of any apparatus of measurement as making an "agential cut", simultaneously revealing what is both included and excluded in the act of observation, inclusive of those semiotic productions which structure bias and privilege.

[SLIDE - 'Area Snap Devices']

The entanglement and "intra-action" (Barad 2007) of instrument and subject is made explicit through Ibiye's development of specialist tools to assist photogrammetric capture. Collectively titled 'Area Snap Devices', these tools, connected to a cheap smart phone, allow three different vertical perspectives for the imaging of space, with the aim of enhancing the dataset through multiple viewpoints and overlaps. The designs of each individual device references objects found and used within the street markets, and are called 'ground view man', 'eye man' and 'bird man', each with their own Krio and Pidgin English names. The deployment of these tools enacts a series of boundaries, between embodied user and digital device, subject and cartographic subjugation, oppressed and oppressor, to highlight the cutting together/apart of different agencies. But even without these innovative tools, the

agential cut is presented through the glitched aesthetics of the photogrammetric output, were the incongruities in the digital modelling and the shadows of digital information demonstrate the insufficiencies of the technology. This in turn implicates an embodied activation of the viewing device itself via a spatial performance and its own limits of accessibility. Deployed as a strategy of counter-mapping, this "cutting together/apart" (Barad 2014) enacts boundaries to manifest pockets of inaccessibility and spaces anterior to colonialist dispossession. Under a techno-feminist appropriation, photogrammetry is a machine visioning that is simultaneously a making and unmaking of extractivist sensibilities.

[SLIDE – Airbnb datafication flower]

This paper has resolved a strategy of appropriation and counter-mapping that engages directly with the aesthetics and processes of photogrammetry. This research has focused on photogrammetry deployed in a deliberate and embodied manner, using capture and presentation of linear image sequences from video footage in a framework which directly empowers the users of the technology. However, attention must be focussed non-contiguous datasets and archives of individual images that equally have collective potential for photogrammetric extractivism. An example is the very limited datasets of images of interior spaces as exhibited on the Airbnb accommodation sharing platform, that under research presented elsewhere, I have contextualised under platform capitalism (Srnicek 2017) and surveillance capitalism (Zuboff 2019). In this case, the appropriation of photogrammetry in the cutting together/apart of intimacy and individuality, and the troubling of public and private space. However, in consideration this presentation today, the partiality of the archive itself must be considered as essential agent in any techno-feminist strategy of resistance.

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