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PRESSURE CONTROLS: DATA FORCES CREEPING THROUGH FINGERTIP COMMANDS

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Tactile modes of operation

Tactile and touch-screen operations are ubiquitous in modern computing environments. Their usage is inevitable for everyday users: from mobile devices to ATMs, from vehicle and work-place dashboards, to wearables and smart watches. But such touch screen operation also creates situations where users participate in the production of complex data sets through routine practices of performative human-computer interaction (HCI).

Due to their magnitude, tactile operations – as a subset of behavioural biometrics – offer methods of verification and authentication as security procedure (Yampolskiy & Govindaraju, 2008; Zhong, Deng, & Jain, 2012). This can generate peripheral datasets with attributes of motor skills, demographics, cognitive and emotional states. In combination with biometric security measures of ubiquitous computing (Weiser, 1991; Parisi, 2013), another black-box emerges; not only obscuring decision processes but disguising opaque data harvesting as 'non-intrusive' user features. While users can investigate the workings of algorithms as black-boxes through experience, haptic feedback and have the potential to be affected by their outcomes (Bucher, 2016; Crawford, 2015; Witzenberger, 2018), this paper explores the limits of such user-based interrogations by scrutinizing technical accelerations in hand-based operations, the relation between trust and 'non-intrusive' data collections and the social, political, and capital dimensions of this data produced through accessing users' fingertip commands.

Behavioural biometrics and the multiplicity of intentionality

With the introduction of the iPhone 6S in 2015, force sensing technology for everyday users shifted from a capacitive touchscreen – able to 'where you touch' by detecting X-Y coordinate(s) – to a pressure sensitivity and sensor resistive screen determining the force being applied (Wright, 2016). This ability to measure force with hand morphology arguably opens a door to mining richer user data. In this shift toward responsive media (Begole, 2017) and haptic interfaces in HCI (Parisi, 2018) classifications of a person's behaviour as a unique biometric are derived from epistemologies of conditioning, habit and reflex, where such behavioural patterns are expected to be stable, measurable, and

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replicable, informing a signature that will occur in the future (Yampolskiy & Govindaraju, 2008). Statistical modelling of neural networks and fuzzy logic informed a basis for quantitative analysis on conventional keyboards (Ahmad, Szymkowiak, & Campbell, 2013) but user data expands with touching, scrolling, or swiping being recorded as technical models of pressure, force, duration, and position. With each representational communication, another is underwritten — data flows as a transformation from a user's behaviour into a multiplicity of intentionality — creating a dissonance between a users' inputs and a technical script. This produces multiple forms of authorship e.g. clicking an item, typing to a loved one, swiping on a map location, can create medical data on motor skills or cognitive deficiencies (Giancardo, Sanchez-Ferro, Butterworth, Mendoza, & Hooker, 2015); demographics (Findlater, Froehlich, Fattal, Wobbrock, & Dastyar, 2013); stress or drowsiness (Exposito, Picard, & Hernandez, 2018; Lee, Tsui, & Hsiao, 2015; Zhong et al., 2012). This data is entrusted by a user to a different, but not necessarily known, group of readers i.e. corporate data bases, engineers, administrators, employers or insurance companies.

This constitutes a 'control creep' (Innes, 2001) as it deviates from the authorised script: not only from the performative patterns read, but from the tactile inputs re-appropriated for another form of governance. While systems of predictive profiling have applications for preventative procedures in securing financial transactions or in privacy features on devices or public networks, this form of non-obtrusive/non-invasive data collection opens possibilities of harvesting without a users' knowledge and so limit a potential for user interrogation. It opens up modes of anticipatory governance "largely directed by black box algorithms working on data of unknown provenance, and is generally closed to recourse" (Kitchin, 2014, p. 178). If we understand this as a shift from traditional phenomenology toward hidden technical sensory environments (Hansen, 2012), this situation creates an intermediate repository of data where user inputs are transformed via black box sensors, algorithmic administration, machine learning and material infrastructure, with ethical and socio-political implications, not visible to the users.

Pressures inside the black-box

To unpack these concerns, this paper builds on the historical algorithmic work of an emerging *haptic media studies* (Parisi, 2018) and employs pressure as an analytical concept: examining the tactical sensors registering force in touch analysis and in haptic technologies; but also pressure placed on users to adopt these devices in commercial, work or school environments. Of concern, are administrative pressures in spaces like industry or education to employ tactile authentication procedures before adequate data regulations have been formed. The authors present case studies examining biometric techniques and force-sensing materials that are cost-effective and scalable to ubiquitous-computing (Vishniakou et al., 2018). By combining these case-studies with how data transformations functions in practice, we demonstrate how user data and computing infrastructures combine as complex assemblages of technical sensing outside a user's knowledge or experience. This is vitally important, as it may afford some grasp, if not direct user agency, over micro temporal operations (Hansen, 2015); not simply to theorise them, but to help live them, through concrete ways data practices may be embraced, reworked, resisted, subverted or trusted by user communities (Kitchin, 2014).

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