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Data that warms: cultural and material transformations of (big) data

Digital data is a fundamental source of value in the Internet economies. This paper is concerned with ongoing trends and practices through which data is converted from a source of value online into a resource of significance beyond the Internet. While there are multiple debates about the implications of the production of digital (big) data in terms of the expanded possibilities for control and surveillance, commodification of free digital labor, or of the emergence of new practices of affect online, little attention is paid on the ways in which the expansinve infrastructuers that facilitate these practices influence realms beyond the Internet.

This paper explores the material and cultural transformations of large-scale digital data streams by turning attention to one of the less visible, and unexciting aspects of the Internet economy – data processing infrastructures. Such a focus allows to illuminate ongoing processes of a notable renegotiation of meaning with regards to the value of digital data.

Infrastructures stand for “the forgotten, the background, the frozen place in technologically mediated practices” (Star, 1999, p. 379) that form the background for other kinds of work. They represent matter that enables the movement of other matter; establish relations between things and people; and have the capacity to operate on the level of fantasy and desire (Larkin, 2013). The Internet is a good example for the latter. Embedded in a metaphoric discourse of decentralisation, wireless interconnections and ephemerality of data, its materiality is deeply centralised, wired and grounded (Starosielski, 2015). In this context, if fiber optic cables materialise the internet, the data processing industry consisting of data centers materialise digital data. In order for digital data to become of value, it is perpetually being physically transported, stored, organised, recoded, and circulated further. While performing these operations, data centres and computer systems generate enormous amounts of heat which in effect drive an increasing need for cooling in order to maintain the stability of communication flows and networks. In this sense, data flows become literal materialisations of McLuhan's (1994) metaphor of hot and cold media, generating physically extreme heat that needs to be tampered with perpetual cooling off. Importantly, as Starosielski (2014, p. 3) argues elsewhere “Heat exchanges are not confined to communications systems, but move across and through infrastructure, ecologies, and bodies.” Building on this idea, I argue that if we look closer at the movement of heat generated by data centres, we could understand better processes of ongoing renegotiations of the meaning, materiality and the value of digital data. To illustrate this point I discuss two empirical cases.

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In 2013 the national Swedish internet provider Bahnhof started rerouting the excessive heat that its data centres generate into the district heating system of Stockholm. Expanding several times its data processing capacities since then, and locating them in a direct physical proximity to the pipes of the district heating system to ease interconnection, the excessive heat created by processing data warms today the homes of the inhabitants of several densely populated districts of Stockholm. Bahnhof and its partner, the company that operates the pipes of the district heating argue for the benefits of rerouting heat from the internet to heat urban homes as a way to offset the industry effects on global warming, “and get paid for that”. Whenever the outside air temperatures get below +7 degrees Celsius (44F), which in Stockholm is the case for around half the year, switching to heating from processing data is profitable (Fortum, n.d.).

The profitability of heat through data has raised corporate imaginaries about the future of data processing, which the executive director of Bahnhof describes as being “not in the countryside, it is in cities with a well connected district heating system” (Bahnhof, 2015).

In support of the latter, Paris has witnessed an even more radical example of transfer of heat from data centres. Since 2013, the French company Quarnot Computing, a provider of rendering services that converts the static data that makes computer graphics and digital animation into sleek movement for the entertainment industry, has been installing hundreds of in-house developed heaters in social accommodations in Paris. The heaters are permanently connected to the internet and are part of a distributed network of computers which constantly render computer graphics. The excessive heat that the process generates, which is comparable to that of a data centre, is emitted through the specialized networked heaters installed in people's homes. As the company writes: “Since 2014, several hundreds of households are heated for free with Q.rads, computing remotely for major banks, 3D animation studios and research labs” (Quarnot Computing, n.d.).

I conceptualise these two cases as material and cultural transformations that embody what Starosielski (2015, p. 18) calls “strategies for interconnection”. The latter concept, she explains, refers to the dependency of global communication flows on constantly putting the network into balance, and offset disturbances. In such a way, the transfer of multiple forms of energy between the systems of the cable network and the cultural geographies into which it is inserted, is facilitated, keeping the network in equilibrium, she suggests. While discursively the two examples of rerouting heat to urban homes in dense European capitals are about environmental efficiency and innovation, materially they represent strategies to put the industries operating with big data economically and materially in balance. The way they do so is by converting digital data from a mathematical and cultural abstraction into a raw material, a natural resource that is comparable to coal, water, or garbage that are commonly used for heating.

These material transformations drive further cultural modulations of the meaning of data. Urban heating through data connects data production with imaginaries of environmentally responsible global citizenship. As such, data production becomes a

strategy for growing a form responsible consumerism and illustrates how infrastructures can produce specific citizens (Larkin, 2013; von Schnitzler, 2008). Consequently, digital data starts being valued by data centres once as a source of content or information that can be sold back online, and twice, for its constant flow and supply as a resource irrespective of its meaning. I argue that, what gets lost in this process is the value of data at the level of its meaning. What is nurtured, instead, is the cultivation of data in terms of its quantity. As a result of this process of devaluation of meaning, and simultaneous increase in the dependency of processing data created by the interconnection made with people's homes and their reliance on heating, there are fostered novel economic practices that are based on computing for the sake of computing. The emergence of cryptocurrencies, such as BitCoin, in which the production of value happens through nurturing a demand for computing power in order to solve difficult mathematical puzzles is therefore a symptomatic example for new broader changes driven by the data processing infrastructures of the Internet.

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