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ART AND THE CONTEMPORARY AFTER 1989

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Arcana Mathematica Imperii: The Evolution of Western Computational Norms

Matteo Pasquinelli

Etymologically, statistics is knowledge of the state, of the forces and resources that characterize a state at a given moment . . . this was an explicit part of *raison d'État* called the *arcana imperii*, the secrets of power, and for a long time statistics in particular were considered as secrets of power not to be divulged.
— Michel Foucault, *Security, Territory, Population*, 1978

In the nonspace of the matrix, the interior of a given data construct possessed unlimited subjective dimension.
— William Gibson, *Neuromancer*, 1984

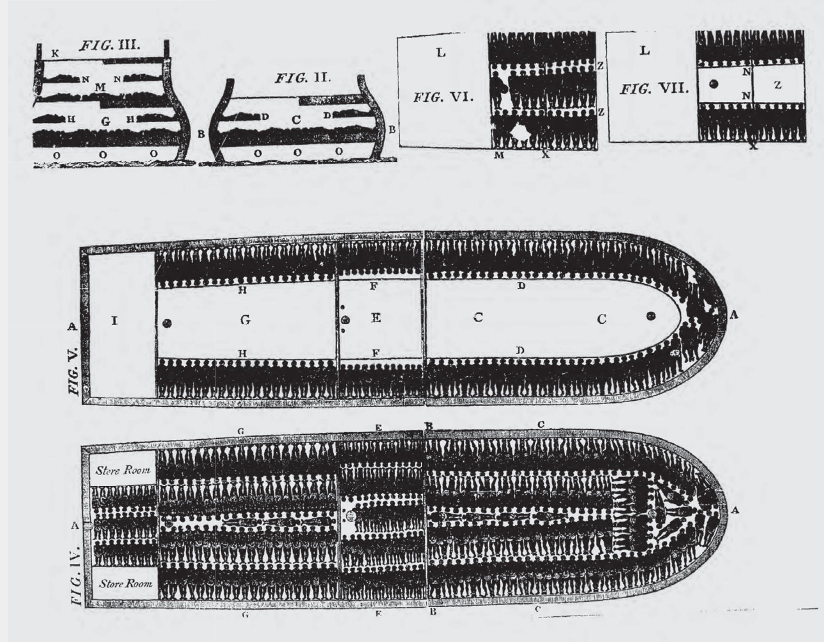
Statistics as *Arcana Imperii*

Power has been always about measuring bodies and populations, and about the cunning interpretation of such numbers for decision making and political strategy. The first known censuses date back five millennia in Egypt and Mesopotamia, and we can easily figure their role in planning agriculture and food distribution. In his 1978 lecture series, published in the book *Security, Territory, Population*, Michel Foucault points out that, specifically in the modern age, the knowledge of the state has developed as “a knowledge of things rather than knowledge of the law,” stressing that the science of the state, or statistics, also has a numerical foundation.[1] In statistics, Foucault aims to discover a mathematics of the state distinct from the mathematics of capital that is traditionally the concern of political economy (albeit the two often exchange “intelligence”). According to his sources, the discipline was born in the small German states of the eighteenth century out of their fierce competition, and the word *Statistik* itself was invented by jurist and economist Gottfried Achenwall in 1749. The need to collect information on the territory and population bred a new generation of apparatuses, which shortly became military assets. The civil knowledge that was gathered about a population, national economy, and infrastructures could easily become the target of the enemy’s military intelligence. There was then a need to protect collective data as *arcana imperii*, as the Roman Empire called “the secrets of power” that offered a strategic advantage against the enemy.

Interestingly, in building the knowledge of the state, a crucial role was assigned to the police, although originally the German institution of *Polizei* had an administrative rather than disciplinary role. Foucault’s historiography has stressed the game of power in the institutions of knowledge, science, and medicine rather than in those of law and discipline, but curiously, in his research on German cameralism and *Polizeiwissenschaft*, this relation is reversed, and he identifies an epistemic role played by the police as well.[2]

What emerges clearly in Foucault is the relation between power and large numbers, their genetic tension, and the growth of mathematical apparatuses out of power crises, geopolitical tensions, and wars—in general, out of the crisis of control in the old European institutions. Later, the modern apparatuses of statistics would be instrumental in the management of genocide, as the collaboration between IBM and the Nazi state demonstrates. Statistics, and later, computation, would enter the field of what anthropologist Allen Feldman has called “xenophobic technicities.”[3] Still, one should never forget that the mathematics of human classification was already operative during the Atlantic slave trade. The conversion of peoples to quantities across the Middle Passage was just the first component of a long history of procedures that media theorist Jonathan Beller has termed “computational colonialism.”[4]

Foucault does not, however, record the merging of the institutions of number with the technologies of number after World War II. The assemblage of institutional statistics with numerical databases has marked the birth of a normative power that Foucault has failed to recognize, although his colleagues Gilles Deleuze and Felix Guattari have not.[5] The long wave of North American cybernetics would cross the Atlantic and reach philosophers such as Raymond Ruyer, Gilbert Simondon, Jacques Lacan, and Deleuze and Guattari, but not Foucault, who remained faithful to a modernist idea of power based on the technical assemblage



Diagrams of slave ships in which African people were chained and transported during the Atlantic slave trade. Human bodies were transformed into quantities and effectively “containerized.” Source: Thomas Clarkson, *The cries of Africa to the inhabitants of Europe, or, A survey of that bloody commerce called the slave-trade* (London, 1822).

of institutions with knowledge apparatuses, but not with knowledge technologies. Cybernetics is in fact the first technopolitics that is the attempt at a normative project via technology and technological protocols. More precisely, cybernetics is the normative project of power in the age of numerical machines.[6]

The development of new numerical apparatuses happens recursively at each historical and technological turn, yet always establishes new symbolic forms and scales of power. In his book *Control Revolution: Technological and Economic Origins of the Information Society*, the American historian James Beniger shows that the information revolution has been materially triggered by the need to measure and control the industrial boom of the postwar United States.[7] Today, the information overflow of the global networks of communication and logistics is opening new landscapes of data that require new techniques of perspective. The recent amplification and transformation of the old numerical matrix of Western power has produced new complex topologies yet to be studied.

What is the symbolic form of the techniques of control based on data mining and machine learning algorithms? Some history of technology is necessary to illustrate the transformation of the numerical grid of ancient registers in the digital matrix of complex databases. Since the late 1970s, that is, since the information revolution, pattern recognition has slowly emerged as the new *computational norm* of power that has expanded and, in some cases, replaced the old institutional norm. Pattern recognition has evolved from the "primitive" (pre-digital) data records of the 1970s into the nonrelational topological spaces of the mid-2010s. The study of the symbolic forms of computation in relation to power and also capital is a necessary step toward envisioning adequate forms of counterpower and countercomputation.

CompStat, or the Birth of the Pattern Police

The most sophisticated algorithms are often modest in origin. Good media archaeology should always ask what kind of material procedures a new technology comes to replace, expand, and amplify (and also what new troubles it introduces). Predictive algorithms are increasingly implemented by the police departments of large metropolises "to predict future crimes," but they are rooted in tools for crime record visualization that were pioneered in the US and Europe in the 1970s. How do predictive policing algorithms work? According to the Santa Cruz-based company PredPol: "Using only three data points—past type, place, and time of crime and a unique algorithm based on criminal behavior patterns, PredPol's powerful software provides each law enforcement agency with customized crime predictions for the places and times that crimes are most likely to occur."[8] Predictive policing algorithms expand and make more computable the idea behind the CompStat system that was developed by the New York Police Department well before the Internet age.

In the late 1980s, Jack Maple was a "cave cop" of the New York Transit Police: the "cave" was a nickname for the New York subway, at the time still a dangerous place. Bored with his routine job, Maple had the idea to start plotting crime records on a big map of the city. "On 55 feet of wall space, I mapped every train station in New York City and every train," Maple explains, "then I used crayons to mark every violent crime, robbery, and grand larceny that occurred. I mapped the solved vs. the unsolved."[9] Maple asked the 76 police precincts to compile crime statistics daily and then fax the data to NYPD headquarters: acetate sheets were applied over a map of the city. "You map everything," Maple repeats, "then you can start looking at patterns and chronic conditions."[10] The shift from information to pattern was already taking place in the mind of a New York cop of the 1980s:

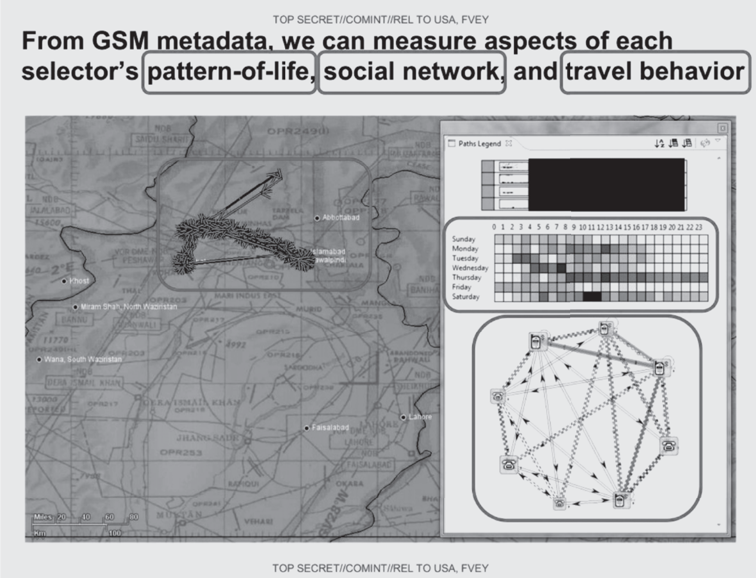
> Maple had put in place a system of computerized, up-to-date crime statistics that provided commanders with a clear picture of day-to-day crime patterns. [The police] convened weekly meetings for top commanders to review crime statistics with their precinct colleagues in an effort to determine response patterns. . . . Maps were important from early on; the new data allowed commanders to visualize where crime was occurring and, crucially, whether arrest patterns matched crime patterns.[11]

By the end of 1994, the crime index in New York City had declined by 12 percent from the year before. This success was attributed to Maple's method.[12] A similar experiment in crime record visualization had been made by NYPD in the 1970s, and cultural theorist Paul Virilio has mentioned a computer-aided visual system called Criminostat under study in France during the same period.[13] Somewhere in between Paris and New York, the pattern police was born.

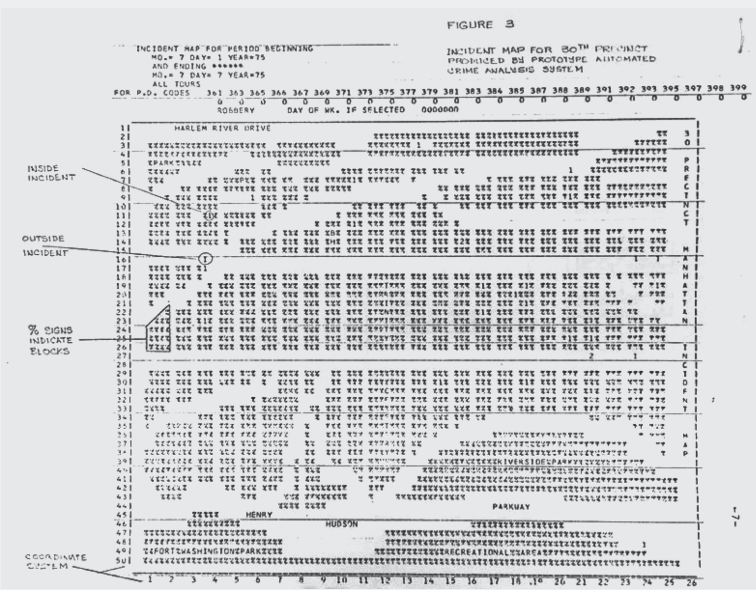
It is remarkable that Maple developed his method before the digital age, just expanding the "broken windows" theory and figuring patterns out of criminal behaviors, unintentionally envisioning a collective criminal unconscious hovering over Gotham. Maple gave his system the visionary name "Charts of the Future," but it was soon turned into the bureaucratic CompStat (short for "computer statistics" or "comparative statistics").[14] In the matrix of CompStat, human beings, streets, and blocks become the cellular automata of an algorithm of power: Deleuze would identify this shift in terms of the "modulation of flows," rather than the "discipline of bodies" in his famous 1990 "Postscript on the Societies of Control."[15] Yet the critique of such predictive algorithms is still in its infancy today. It is clear that the recursive mapping of securitarian correlations simply reinforces patterns of race and class, yet in this process of consolidating existing social segmentations, new criminal patterns and the construction of new criminal subjectivities may occur. Securitarian algorithms, as much as institutional protocols, are always contingent: even when they are wrong, they positively produce reality—often a deadly one.

Skynet, or the Miscomputation of the Enemy

12 December 2013. It is just before sunset near the town of Radda in Yemen. A convoy is driving to a wedding celebration, when suddenly a mosquito-like buzz is heard in the sky before every car is incinerated by four missiles fired from a US drone, killing 12 innocent civilians. As *The Nation* reports of this incident, "the US has bombed at least eight wedding parties since 2001," that is, since the beginning of the so-called War on Terror.[16] These targets happened to be blindly selected by statistical algorithms (often pompously labeled "artificial intelligence") that had found similarities between their patterns-of-life and those of known terrorists. These attacks are called signature strikes because they are ordered without knowing the identity of the designated targets, on the basis of the "signature" of metadata that the targets leave on communication networks in terms of patterns-of-life (movement from one point to another, their network of contacts, and the usage of mobile phones).[17] By comparing the patterns-of-life of millions of civilians with those of known terrorists,



A slide from a classified presentation of the National Security Agency program Skynet, which illustrates the pattern-of-life analysis of a target near Abbottabad, Pakistan. Global Systems for Mobile Systems (GSM) metadata are used to describe a layer of geospatial movements and a more abstract layer of social relations and habits. Source: *The Intercept*



Prototype of an automated crime analysis system developed by the New York Police Department in 1975. The map of a portion of Harlem (lined on a typewriter) uses modular symbols to mark blocks, incidents, and petty crimes. Source: New York Police Department

the algorithm attempts to guess the unknown ones. Tragically, the digital footprints left by wedding parties match those of previous meetings of insurgents: innocent deaths are the result of a miscomputation. As the former director of the US' National Security Agency (NSA) Michael Hayden cruelly summarizes, "we kill people based on metadata."[18]

Skynet is the name of this classified NSA project to collect metadata (and only metadata) from millions of phone conversations within a large region or zone, such as the border between Afghanistan and Pakistan. The algorithm computes metadata alone as a way to scale down gigantic datasets and, interestingly, it works regardless of the language spoken and—more importantly—any encryption. There is no time to analyze all messages word by word, especially in a foreign language, or to run decryption software. This system of metadata-based and activity-based analysis concentrates on what people are doing rather than on what they are saying. It is important to stress that the patterns-of-life signature emerges regardless of the message content and the identity of the messengers. "Metadata absolutely tells you everything about somebody's life. If you have enough metadata, you don't really need content. [It's] sort of embarrassing how predictable we are as human beings," confesses NSA General Counsel Stewart Baker.[19] According to the documents and slides that were leaked to *The Intercept* in 2015:

> Skynet engages in mass surveillance of Pakistan's mobile phone network, and then uses a machine learning algorithm on the cellular network metadata of 55 million people to try and rate each person's likelihood of being a terrorist. . . . Somewhere between 2,500 and 4,000 people have been killed by drone strikes in Pakistan since 2004, and most of them were classified by the US government as 'extremists,' the Bureau of Investigative Journalism reported. . . . In the years that have followed, thousands of innocent people in Pakistan may have been mislabelled as terrorists by that 'scientifically unsound' algorithm, possibly resulting in their untimely demise.[20]

Extensive literature is devoted to the drone as a war apparatus, but much less to its "brain"; to the techniques of data analytics and machine intelligence that direct the drone to its target.[21] The patterns-of-life that are computed via machine learning algorithms are an example of the computational norms that come to expand traditional military techniques and their normative power. Perhaps in any disciplinary power the subject is always constructed *in absentia*, but these enemies are assembled with digital footprints and made of pure dividuals: the enemy of the West emerges here as a clumsy mathematical construct. As Virilio prophetically remarks in the case of the French system Criminostat, in a world of pervasive computation and forecasting, the confession of the crime would be no longer necessary.[22]

Ayasdi, or the Topology of the Abnormal

Overflowing with information, the old network society has become an uncanny monopoly of data centers and molted its skin to become the metadata society—a form of capital and power based on the intelligence of large dataset.[23] Around 1998, the first Google database (called "the Cage") marked the beginning of this topological transformation: the slow and parasitic growth of a global infrastructure of server farms parallel to the network society. As much as the US required the "control revolution" of information technologies after World War II in order to manage its industrial surplus, the data surplus accelerated by global digital networks has demanded a new layer of abstraction: machine learning as a solution against the chaos of big data. Not surprisingly, after pioneering the network form and the protocols of the Advanced Research Projects Agency Network (ARPANET, the progenitor of the Internet back in the 1960s), the Defense Advanced Research Projects Agency (DARPA) today stands behind the sophisticated algorithms for analytics and the navigation of large datasets. The passage from the network form to machine intelligence as a strategic and military asset is a historic one, as global data centers come to shield the very *arcana imperii* of the present, like statistics once did.

Ayasdi is a software company specializing in machine intelligence and advanced analytics that has been sponsored by DARPA, among other investors. Ayasdi's core technique is the application of Topological Data Analysis, which can be explained as the transformation of the numerical matrix of databases into spatial dimensions, in order to unveil hidden relations intuitively. If CompStat projects crime records along urban coordinates, and Skynet detects patterns-of-life across large communication networks, Ayasdi attempts to universalize pattern recognition and anomaly detection for any kind of dataset. In machine learning, there is an important distinction between supervised and unsupervised learning. Skynet, for instance, is a program of supervised learning, as the patterns-of-life of potential enemies are discovered on the basis of a training dataset of documented ones. On the contrary, unsupervised learning aims to find hidden structures in unlabeled raw data without giving any hints to the search algorithm. In this way, machine learning unveils hidden patterns, correlations, tendencies, and structures that would be otherwise inconceivable for human cognition. Paraphrasing a notorious formulation by former US Secretary of Defense Donald Rumsfeld, supervised learning is a way to map the known unknowns, whereas unsupervised learning is a way to uncover the unknown unknowns. Nevertheless, in both cases, the initial dataset used to train the machine influences the final result: that means that the previous norms and patterns (found in whatever communication data, institutional documents, pre-digital images, cultural heritage, etc.) ground an information layer that always influences the computation of new norms.

Under the eyes of machine learning algorithms, the world is going to look different. An important application for the analysis of datasets is found in hospitals and medical laboratories: for instance, machine learning algorithms can find correlations between cancer genomes and life expectancy. Topological Data Analysis appears to be universally applicable; to popularize its services, Ayasdi has revealed 13 new basketball positions against the known 5 and presented the results to Barack Obama.[24] In the future, such topological constructs will be as familiar as the network form was in the 1990s.

Given a dataset, Topological Data Analysis draws a conurbation of links like an abstract landscape, suggesting in this way if a pattern, a new norm, is emerging in an area of higher density of connections. At the same time, spikes and anomalies creep into the periphery of such a datascape. This system operates by two basic functions: pattern recognition and anomaly detection. As I have written elsewhere, "the two epistemic poles of pattern and anomaly are the two sides of the same coin of algorithmic governance. An unexpected anomaly can be detected only against the ground of a pattern regularity. Conversely, a pattern emerges only through the median equalization of diverse tendencies."[25] Future subjectivities will be most likely described and composed of similar dividuals, that is, of individual and collective metadata represented in a geometric form.

The Algebra of the Condividual

Topological Data Analysis marks the last technical evolution of the institutional norm that was born in the ancient registers of power and capital: the grid of this new norm (the standard of social behavior or profitable production) is no longer validated from above, but statistically computed from below. It is a computational norm rather than an institutional one, as computation comes to automatize the work of the institution at large. Machine intelligence is just a technique to render patterns of behavior and production accurately. Likewise, the abnormal, the social anomaly, and deviation from the norm are found and demarcated via data and metadata. The border between normal and abnormal is no longer policed by discipline, as Deleuze notes, but modulated by numerical control like a dynamic flow.[26]

Not by chance, Ayasdi's website advertises solutions for both "optimizing yield performance" in industrial production and "detecting malware attacks" in communication networks. The computational norm appears to be evenly applied across the domains of market and surveillance. It is equivalent in relation to both power and capital: the way it detects the social anomaly to control is the same way it identifies the locus of surplus value to extract. Consistently focusing on the functions of pattern recognition and anomaly detection across the full spectrum of reality, computation finally establishes a common axiomatics between capital and power.

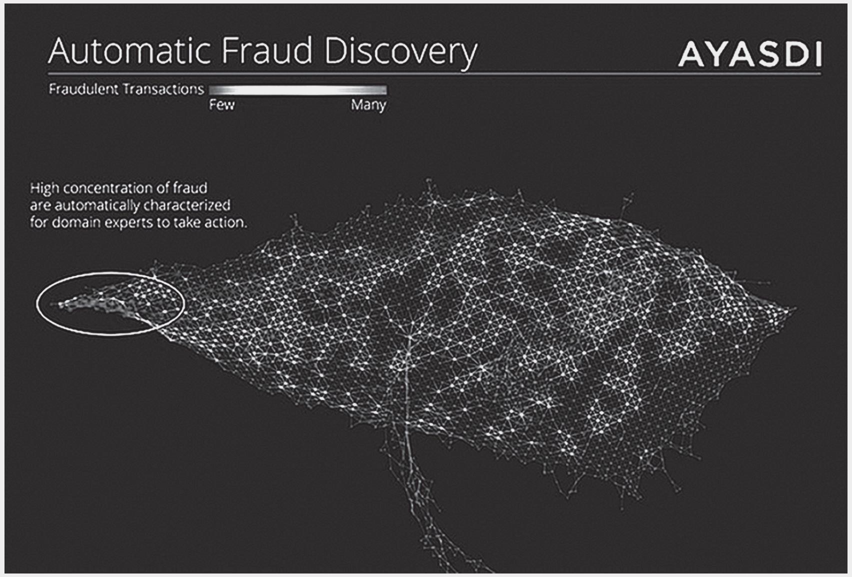
In the evolution of the Western matrix of control and production, surplus value extraction and social norm enforcement have eventually come to be computed through the same technical form, that is, data analysis: the mathematics of power and the mathematics of capital finally superimpose themselves on the same datascape and become translatable into one other. Planetary computation has grounded companies (such as Google) whose power is greater than traditional states, and the post-Westphalian order has included the virtual territories of global datacenters.[27] The border of Western imperialism appears to extend vertically along the datascapes owned by corporations that are mostly based in Northern California.

Unsupervised machine learning carries the computation of power and capital into unknown territories: power and capital emerge there as a higher form of intelligence that is able to perceive correlations and opportunities that are not accessible to the human mind, therefore introducing a cognitive divide that is deeper than any digital divide. Machine intelligence inaugurates an alien domain of power, of which drone warfare is just a peripheral territory. The introduction of the topological perspective to large datasets is the birth of a symbolic form that is comparable only to the birth of modern perspective in Florence during the early Renaissance thanks to Arab techniques of optical projection used in astronomy.[28] There, the compass that had been oriented to the stars was turned downwards and pointed toward the urban horizon. A further dimension of depth was added to portraits and frescos and inaugurated a new vision of the collective space. It was a revolutionary event of the aesthetic kind, yet charged with political consequences—the construction of the infinite within the limited field of perception, as art historian Erwin Panofsky notes.[29] Similarly, a yet more abstract perspective on the world is initiated today by global datacenters and the mathematicians of the datascape.

If inaccessible datacenters and the mathematics of machine learning constitute the *arcana imperii* of the present, how, then, to confront them? In a prophetic passage of *Schizoanalytic Cartographies* dated 1989, the same year the Berlin Wall fell, Guattari frames Western history according to three stages of deterritorialization: European Christianity, capitalism, and the age of "planetary computerization," which would hopefully open up "a creative and singularizing processuality" for everyone.[30] Guattari does not perceive digitalization as a threat to the human. "With the temporality put to work by microprocessors," he remarks, "enormous quantities of data and problems can be processed in minuscule periods of time, in such a way that the new machinic subjectivities keep on jumping ahead of the challenges and stakes with which they are confronted."[31] Recently, cultural anthropologist Diane M. Nelson has shown the potentiality of "ethnomathematics" in her documentation of the Guatemalan genocide (1981–1983).[32] She reminds everyone of the macabre etymology of algebra (from the Arabic *al-jabr*, bonesetting, the reunion of broken parts of a body), of the two "skeletons" that have to be recomposed on each side of the equation. Numbers are, for many people, the medium of colonization, but Nelson holds that "numbers are deeply entangled in both violence and amazement, oppression and emancipation."[33] She tells us that a mathematics of the people against the mathematics of governments (that want "to count for them") is possible and, indeed, there are still too many "struggles to count."[34]

More and more alternative techniques of data mining are being explored today by an emerging data activism that fights for social justice, human rights, and equal access to education and welfare.[35] But what if data analytics and topology actually manage to unveil a superior social dimension that is intrinsic in any piece of information and that has been intangible and inaccessible until now? What if these techniques of data visualization and navigation finally give an empirical form to modern concepts of collective agency, such as Marx's general intellect, Foucault's episteme, Simondon's transindividual, which have thus far been abstract and invisible to the individual eye?

Deleuze describes the logical unit of power in the age of computation as the dividual: the power embodied by "data banks" would no longer be interested in targeting specific subjects, but only in modulating preindividual and collective patterns.[36] Taking a work by artist Paul Klee as inspiration,[37] Deleuze's notion of the dividual can be properly understood in relation to his book *The Fold*, in which he offers a concept to complete the dividual at the collective scale: the superject.[38] If we focus only on the deconstruction of the individual into dividuals, we miss its



An example of Topological Data Analysis developed by Ayasdi for fraud detection in credit card transactions. Contrary to the previous images, this is an abstract "space" that does not represent spatial proportions in the physical world; it is the "nonspace of the mind," as cyberpunk novelist William Gibson might observe. Courtesy Ayasdi, Inc.

political reconstruction and assemblage as condividual. Data and metadata can be considered the dividuals that are used to compose new superjects or condividuals, whose coordinates are transversal to old subjectivities and open to new combinatories: the condividual is not the community as we know, but rather the invisible community of workers, migrants, and citizens yet to emerge.[39]

You can see the computational norm from two sides. From the point of view of power, it is the problem of abnormal behavior to modulate. From the point of view of collective intelligence, it is the birth of a new ultranormal behavior, the mark of a supersocial form of life.

1. Michel Foucault, *Security, Territory, Population: Lectures at the Collège de France 1977–1978*, trans. Graham Burchell (London: Palgrave Macmillan, 2009), p. 274.
2. Ibid., p. 315.
3. Allen Feldman, "Xenophobic Technicities: A Media Archeology" (lecture as part of Studium Generale Rietveld Academie, *Bots, Bodies, Beasts: The art of being Humble*, De Brakke Grond, Amsterdam, 9 April 2016). See also Allen Feldman, *Archives of the Insensible: Of War, Photopolitics, and Dead Memory* (Chicago: University of Chicago Press, 2015).
4. See also Simone Browne, *Dark Matters: On the Surveillance of Blackness* (Durham, NC: Duke University Press, 2015). Jonathan Beller refers to computation and colonialism in Ante Jeric and Diana Meheik, "From *The Cinematic Mode of Production* to *Computational Capital*: An Interview with Jonathan Beller for *Kulturpunkt*," *Social Text*, 31 January 2014, online at: http://socialtextjournal.org/from-the-cinematic-mode-of-production-to-computational-capital-an-interview-with-jonathan-beller-for-kulturpunkt/.
5. There is a long hiatus between the work of Norbert Wiener on cybernetics in the 1940s (numerical information as medium of power) and the work of Foucault on biopolitics in the 1970s (institutional knowledge as medium of power), yet there is an incredible similarity between Foucault's 1982 lecture on the art of government as piloting (*pilotage*) and the 1963 book on government as the art of steering (or cybernetics) by Wiener's protégé Karl Deutsch. See Karl Deutsch, *The Nerves of Government: Models of Political Communication and Control* (New York: The Free Press, 1963).
6. For a basic introduction to machine learning algorithms, see Pedro Domingos, *The Master Algorithm: How the Quest for the Ultimate Learning Machine Will Remake Our World* (New York: Basic Books, 2015).
7. James Beniger, *The Control Revolution: Technological and Economic Origins of the Information Society* (Harvard, MA: Harvard University Press, 1986).
8. See PredPol website, online at: http://www.predpol.com/.
9. See Raymond Dussault, "Jack Maple: Betting on Intelligence," *Government Technology*, 31 March 1999, online at: http://www.govtech.com/magazines/gt/Jack-Maple-Betting-on-Intelligence.html.
10. Ibid.
11. See "NYPD and CompStat" in *From CompStat to Gov 2.0: Big Data in New York City Management* (New York: Columbia University School of International and Public Affairs, 2014), online at: http://ccnmtl.columbia.edu/projects/caseconsortium/casestudies/127/casestudy/www/layout/case_id_127_id_886.html.
12. Statistics are always "political," since they are easy to manipulate, see Saki Knafo, "A Black Police Officer's Fight Against the NYPD," *The New York Times Magazine*, 18 February 2016, online at: http://www.nytimes.com/2016/02/21/magazine/a-black-police-officers-fight-against-the-nypd.html.
13. Paul Virilio, *Speed and Politics*: *An Essay on Dromology*, trans. Mark Polizzotti (Los Angeles: Semiotext(e), 1986), p. 170. The Criminostat is also mentioned in *Revue internationale de criminologie et de police technique*, vol. 32–33 (1979).
14. In February 2016, the New York Police Department released CompStat 2.0. This second version does not feature major innovations, but only a direct integration with smartphones and social media. Interestingly, the Chicago Police Department is using data directly scraped from social media platforms, such as Twitter, to track and forecast violent crimes. See John Buntin, "Social Media Transforms the Way Chicago Fights Gang Violence," *Governing* (October 2013), online at: http://www.governing.com/topics/urban/gov-social-media-transforms-chicago-policing.html.
15. See Gilles Deleuze, "Postscript on the Societies of Control," *October*, no. 59 (Winter 1992). See also David Savat, "Deleuze's Objectile: From Discipline to Modulation," in *Deleuze and New Technology*, Mark Poster and David Savat, eds. (Edinburgh: Edinburgh University Press, 2009).
16. Tom Engelhardt, "The US Has Bombed at Least Eight Wedding Parties Since 2001," *The Nation*, 20 December 2013, online at: https://www.thenation.com/article/us-has-bombed-least-eight-wedding-parties-2001/.
17. See Grégoire Chamayou, *A Theory of the Drone* (New York: The New Press, 2015). See chapter "Pattern-of-Life Analysis," pp. 46–51, in particular.
18. David Cole, "We Kill People Based on Metadata," *The New York Review of Books*, 10 May 2014, online at: http://www.nybooks.com/daily/2014/05/10/we-kill-people-based-metadata/.
19. Alan Rusbridger, "The Snowden Leaks and the Public," *The New York Review of Books*, 21 November 2013, online at: http://www.nybooks.com/articles/2013/11/21/snowden-leaks-and-public/.
20. Christian Grothoff and Jens Porup, "The NSA's SKYNET program may be killing thousands of innocent people," *Ars Technica*, 16 February 2016, online at: http://arstechnica.co.uk/security/2016/02/the-nsas-skynet-program-may-be-killing-thousands-of-innocent-people/.
21. Such a loose datascape of quasi-intelligent algorithms has inaugurated a troublesome legal scenario for the chain of command of the army and the president of the US. See Susan Schuppli, "Deadly Algorithms: Can legal codes hold software accountable for code that kills?," *Radical Philosophy*, no. 187 (September/October 2014), pp. 2–8.
22. Virilio, *Speed and Politics*, p. 170.
23. See Matteo Pasquinelli, "Italian *Operaismo* and the Information Machine," *Theory, Culture & Society*, vol. 32, no. 3 (May 2015), pp. 49–68. See also Pasquinelli, "Metadata Society," in *Posthuman Glossary*, Rosi Braidotti and Maria Hlavajova, eds. (London: Bloomsbury, forthcoming).
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