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Is The Universal Turing Machine a Capitalist Super-Machine?

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Abstract

This paper explores the hypothesis that capitalism might be understood as a computational phenomenon, akin to a program running on a Universal Turing Machine (UTM). Grounded in the principles of digital physics, Marxist theory, and techno-criticism, it proposes that if the universe is fundamentally computable, then socio-economic systems like capitalism could also be seen as outputs of this universal computational process, thus questioning whether capitalism emerges as a neutral outcome or as an inevitable consequence of its design. Drawing from philosophical and political critiques, the paper interrogates the implications of this hypothesis for human agency, resistance, and the construction of alternative social frameworks. The film *Cube* is used to illustrate the dynamics of interacting with a capitalist super-machine. Furthermore, the paper reflects on quantum computing›s impact on the UTM hypothesis.

Keywords: Marxism, Digital Physics, Universal Turing Machine, Philosophy of Technology.

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Introduction

In an era where computation increasingly mediates every aspect of human life, from social interactions to global economic exchanges, the boundaries between the digital and the real, the material and the immaterial, grow ever more porous. This paper explores a provocative hypothesis at the intersection of digital physics, Marxist theory, and techno-criticism: *Can capitalism be interpreted through the metaphor—or possibly the ontological frame—of a program running on a Universal Turing Machine (UTM)?* This overarching hypothesis poses a dual interpretive challenge. On the one hand, it engages digital physics' claim that the universe is fundamentally computable, suggesting that socio-economic systems, like capitalism, may emerge as expressions of a larger universal computation. On the other hand, it investigates the metaphorical use of the UTM—not as a literal substrate, but as a conceptual tool—to critique capitalism's structural logic and pervasive reach.

Thus, the central hypothesis is not a fixed ontological claim, but an exploratory device that toggles between computational literalism and critical metaphorology. What does it mean to see capitalism as a 'program'? What are the implications of such a framing, and who benefits, suffers, or resists under its logic? This ambivalence is intentional, and the paper develops it through a layered methodological approach, drawing on media theory, Marxist analysis, digital ontology, and cultural critique.

The relevance of this inquiry is underscored by the contemporary moment. Today, digital technologies are not merely tools or platforms but are deeply embedded in the social and economic fabric of our world. From the algorithms that govern financial markets to the data-mining techniques that underpin surveillance capitalism, there is a growing recognition that digital computation does not simply represent reality but actively participates in constructing it. As Shoshana Zuboff argues in *The Age of Surveillance Capitalism*, the digital age is not simply an age of machines and markets, but an age of a new kind of capitalism that commodifies human experience.[1] Against this backdrop, examining whether capitalism could be seen as a 'program' generated by the inherent logic of a Universal Turing Machine[2] offers both a conceptual metaphor and an ontological speculation, a new lens through which to interrogate the intersection of computation, social organization, and power.

1 Shoshana Zuboff, *The Age of Surveillance Capitalism* (Public Affairs, 2019), 13.

2 Modern digital computers can be understood as concrete instantiations of the UTM, modeled after von Neumann architecture to represent computation. However, within the framework of this paper, it is more accurate to conceptualize the UTM as a formal system—a set of rules for symbol manipulation. While the UTM can be instantiated by these formal rules, its abstract nature is rooted in its logical and mathematical properties, rather than any physical or metaphysical form. In this sense, the UTM serves as a virtual embodiment of the concept of computability, which exists independently of any specific machine or implementation. See David Deutsch, *The Fabric of Reality: The Science of Parallel Universes—and Its Implications* (Allen Lane, 1997), 97–101.

This paper is organized into five sections, each exploring different facets of the overarching hypothesis. Section 1 introduces the concept of digital physics and the Universal Turing Machine (UTM), framing the hypothesis that if the universe is computable, so too might be social systems like capitalism. Section 2 examines two scenarios arising from the hypothesis. First, the UTM as a 'neutral' computational device capable of simulating any possible configuration, including capitalism, as merely one among many. Second, it explores the idea that the UTM might inherently encode a bias towards capitalist structures, privileging their emergence as an inevitable outcome of its design. In Section 3, we delve into the philosophical and political ramifications of both scenarios. It considers how a neutral or biased UTM aligns with Marxist critiques of capitalism as either a contingent or necessary form of social organization, incorporating perspectives from thinkers like Fredric Jameson, David Harvey, and Herbert Marcuse. This is followed by Section 4, which connects this thought experiment to contemporary critiques of capitalism, particularly those that argue for its seeming inevitability in our current era of digital governance. Drawing on techno-critical perspectives from scholars such as Gilles Deleuze, Félix Guattari, and Jacques Derrida, this section explores how viewing capitalism as a computational process challenges our understanding of human agency, resistance, and the potential for alternative social structures. Here, metaphorological reading intersects with cultural analysis as we also briefly explore Vincenzo Natali's 1997 horror film *Cube* as a fictional yet scarily accurate representation of a capitalist super-machine by examining the dynamics of predicting and reacting to the machine's outputs (its movements) while being unable to alter its pervasive existence. Finally, Section 5 synthesizes the insights gained from the exploration, reaffirming the paper's central hypothesis and its implications for both the philosophy of computation and social theory. It invites further inquiry into the exact nature of UTM as a capitalist super-machine and whether it should be understood in procedural or prescriptive terms, and whether the relationship between computation and capitalism is one of contingency or inevitability. The final section also reflects on the inscrutable consequences of running the 'capitalism program' on a quantum computer allowing input to be processed not just in one but multiple universes. In all cases, however, matters of normativity and agency (cornerstones of Marxism and dialectical materialism) are left futile if indeed we are products of a capitalist UTM.

Why does this matter? I believe that such an inquiry is critically important today, given the increasing dominance of digital and algorithmic processes in shaping not just economic behaviours but also political, cultural, and social realities. As machine learning algorithms dictate what news we read, what products we buy, and even how social justice movements are surveilled or suppressed, the stakes of understanding the deeper relationship between computation and capitalism have never been higher. Furthermore, as artificial intelligence and quantum computing begin to push the boundaries of what is

computable, and as developments in cloud computing continue to muddle the segregation of commercial services owned by large corporations and public spheres, questioning the neutrality or bias inherent in these computational architectures becomes not just a theoretical exercise but a pressing political and ethical concern. By examining whether capitalism is a contingent output of a neutral computation, or an inevitable result embedded in the logic of a Universal Turing Machine, this paper seeks to provide a novel framework for understanding the entanglement of technology, social systems, and power in the 21st century. More than just food for activist thought, it is an urgent call to rethink the assumptions, fictional and practical, underpinning both our technological future and the socio-economic orders they sustain.

1. Digital Physics and Computability

To further unpack the article's central hypothesis—that capitalism may be interpreted as a computational, machinic system—we must turn to the theoretical framework of digital physics. Digital physics[3] is a hypothesis suggesting that the universe itself is fundamentally computational. It goes back to Konrad Zuse's work in the 1960s, particularly his book *Rechnender Raum*, where he proposed that our known universe could be understood as a kind of discrete automaton or digital computer.[4] This idea builds on the observation that all known laws of physics, when expressed mathematically, can be computed through approximations on digital machines.[5] In other words, the physical universe behaves in ways that can be simulated by a digital computer (more on simulation later).

A Universal Turing Machine (UTM), a theoretical construct proposed by British mathematician Alan Turing, is a mathematical model of computation that can simulate any algorithm given sufficient time and resources.[6] If the universe is computable, it could, in theory, be simulated on a UTM. This forms a key ontological claim of digital physics: that reality itself may be reducible to computational processes. Turing's notion of the UTM as a computational entity raises profound questions about the nature of universality and computability. As Turing articulates, the UTM is a "machine that can do any calculation that any human computer can do."[7] The UTM's universality lies in its ability to replicate the function of any other Turing machine given the correct inputs and instructions, suggesting that any process that can be formalized as an algorithm is, in

3 Sometimes referred to as "pancomputationalism".

4 Konrad Zuse, *Rechnender Raum* (Vierweg, 1969), 66.

5 See Stephen Wolfram, *A New Kind of Science* (Champaign, IL: Wolfram Media, 2002), 7–11; and Seth Lloyd, *Programming the Universe: A Quantum Computer Scientist Takes on the Cosmos* (New York: Knopf, 2006), 1–7.

6 Alan Turing, "On Computable Numbers, with an Application to the Entscheidungsproblem," *Proceedings of the London Mathematical Society* 58 (1936).

7 Turing, "On Computable Numbers," 230.

principle, computable by the UTM. According to theoretical physicist David Deutsch, this is a profound idea because it implies that computation is not tied to specific hardware or material instantiations—it is a fundamental property of information itself.[8]

This claim of computation as a universal ontology opens new philosophical terrains. If the universe itself is computational, it becomes plausible to view complex social systems like capitalism not only as historically contingent but also as computationally emergent. The UTM thus becomes more than a theoretical construct; it is also a metaphor for a kind of machinic totality. One also finds resonances of this view in religious and mystical traditions, such as the *Tractate Shabbat* in Judaic philosophy, where the universe is conceived as an informational sphere running on the alphabetical code of Hebrew letters.[9] Both the secular and the religious versions share the same impulse: to recast physical and metaphysical reality in terms of code, rules, and executable logic.

Moreover, the UTM is not just a mathematical curiosity but a philosophical model for understanding how knowledge is generated, processed, and stored. It embodies the idea that any process—physical, mental, or biological—can, at least in principle, be translated into an algorithmic form. This universality supports Deutsch's broader claim that science is about creating good explanations: structured patterns and algorithms that can predict and explain systemic behaviour.[10] For our purposes, this leads to a fundamental question: if the universe operates according to computational laws, and if capitalism emerges from that same universe, might capitalism itself be understood as an algorithmic or machinic expression of universal computability?

However, Turing's own reflections on the "halting problem" (*das Entscheidungsproblem*) introduce a critical nuance to this computational ontology. The halting problem, which Turing proved to be undecidable, demonstrates that there is no general algorithm that can determine whether any given program on a UTM will eventually stop or continue running indefinitely. As Turing states, "It is impossible to construct a machine that will determine whether an arbitrary machine ever prints a given symbol." [11] This undecidability implies that while the UTM can simulate any algorithm, it cannot predict the outcome of all computational processes. The halting problem thus marks a paradoxical boundary: even a totalizing machine cannot fully anticipate the future of its own operations. This is where our analogy to capitalism becomes especially salient. Integrating this with Marxist thought, the halting problem becomes a useful metaphor for the unpredictable crises and contradictions inherent in capitalism. Just as a UTM cannot foresee whether a

8 Deutsch, *The Beginning of Infinity*, 94.

9 Yuval Noah Harari, *Nexus: A Brief History of Information Networks from the Stone Age to AI* (Fern Press, 2024), 83.

10 Deutsch, *The Beginning of Infinity*, 42.

11 Turing, "On Computable Numbers," 259.

computation will halt, capitalism, as Marx describes, is riddled with internal instabilities that disrupt its functioning. The 2008 global financial crisis, triggered by the collapse of housing markets and speculative financial instruments, is an apt example of such a sudden systemic breakdown. Similarly, crises of overproduction, where goods cannot be sold profitably despite technological abundance, highlight capitalism's contradictory drive toward limitless expansion.

In the first chapter of *The Communist Manifesto*, "Bourgeois and Proletarians," Marx and Engels describe the periodic crises of capitalism as unavoidable ruptures:

> It is enough to mention the commercial crises that, by their periodical return, put the existence of the entire bourgeois society on its trial, each time more threateningly [...] Society suddenly finds itself put back into a state of momentary barbarism [...] The conditions of bourgeois society are too narrow to comprise the wealth created by them.[12]

Just as the halting problem reveals the limits of formal computation, Marx shows how capitalist dynamics inevitably exceed the system's capacity for self-regulation. Crises appear not as anomalies, but as algorithmic bugs, breakdowns written into the code of capital itself. As Marx puts it in the *Grundrisse*, "Capital itself is the moving contradiction", a system that seeks to minimize labor time while simultaneously relying on labor time as its core measure of value.[13] This contradiction resonates with the UTM's own structure: it is a machine of infinite possibility constrained by finite resources: time, space, energy. Similarly, the UTM, in its universality, can be read as the ideal capitalist machine, abstracting, standardizing, and automating all inputs into executable outputs. It reflects the capitalist dream of total optimization, where every process can be codified, monetized, and made operationally efficient. As we noted earlier, the UTM's power lies in its ability to simulate any machine. This feature mirrors capitalism's drive toward fungibility and abstraction, in which labor, commodities, and social relations are reduced to exchangeable units of value.

In *Capital*, Marx writes: "The value-form of the product of labour is the most abstract, but also the most universal form of the bourgeois mode of production; by that fact it stamps the bourgeois mode of production as a particular kind of social production of a historical and transitory character."[14] Just as the UTM erases the material specificity of individual machines to encode them in a shared symbolic language, so too does capitalism dissolve

12 Karl Marx and Frederick Engels, *The Communist Manifesto*, in Marx and Engels *Collected Works*, vol. 6, ed. Natalia Karmanova, Margarita Lopukhina, and Galina Sandalova, trans. Vladimir Litvinov (London: Lawrence & Wishart, 1976/2010), 489.

13 Karl Marx, *Grundrisse*, trans. Martin Nicolaus (Penguin, 1973), 706.

14 Karl Marx, *Capital Volume I*, trans. Ben Fowkes (Penguin, 1976), 174.

particularities—cultural, ethical, relational—into a generalized regime of value. We are thus left with a provocative convergence: the UTM as a theoretical limit of computation and capitalism as a historical realization of abstraction, automation, and algorithmic governance. Does this imply that capitalism is merely contingent, a side effect of a computational universe? Or does it reveal an intrinsic affinity between computation and capital: a shared logic of recursion, standardization, and systemic contradiction?

In this sense, the halting problem serves as a reminder of the limits of determinism, whether computational or economic. It suggests that while both the universe and capitalism may be modelled as computational systems, their outcomes remain irreducibly open—subject to breakdowns, crises, and interruptions that cannot be fully predicted from within the system. This indeterminacy does not undermine the analogy; it sharpens it. Just as the UTM is defined not only by what it can simulate but also by what it cannot foresee, so too is capitalism defined as much by its expansions as by its inevitable halts.

2. The Universe as a Computation

The hypothesis pursued in this section is as follows: if the universe is computable, then there is no inherent contradiction in proposing that social systems like capitalism could be interpreted as programs running on this Universal Turing Machine (UTM). This suggests that capitalism might be a product of computational processes rather than solely human agency or material history. The section unfolds via two contrasting scenarios, which each explore a different interpretation of the UTM's nature—as either a neutral system or a structurally biased one—and evaluates what each would imply for our understanding of capitalism. These are not mutually exclusive but rather function as conceptual boundary cases for testing the limits of the central hypothesis.

Scenario A: The UTM as a 'Neutral' Computational Device

Premise: The UTM is assumed to be a neutral, universal simulator capable of processing and outputting any formalizable process, including socio-economic systems.

In this scenario, the UTM is regarded as a non-partisan, abstract machine: a formal structure indifferent to content, able to simulate all possible rule-based systems, from simple patterns to complex social organizations. If capitalism appears as an output, then it does so not because it is inevitable, but because it is one possible outcome among an infinite number of others. In this sense, capitalism's emergence can be seen as contingent rather than essential, an accidental by-product of specific inputs and conditions.

This interpretation aligns with the work of Hardt and Negri, who in *Empire* argue that

capitalism is an historical artifact rather than a natural necessity. The modern capitalist empire, according to them, is not rooted in universal laws but in historical battles and constructions that eliminate "the outside" and promote a new topology of hybridity and artificiality.[15] Ian Angus, in a reading of *Empire*, extends this by describing history as a process of eliminating exteriority, paving the way for an imperial sovereignty that reconfigures social subjectivity.[16] Within this framing, the UTM's neutrality allows for other possible socio-economic 'programs' to be instantiated. That is, the same computational system that outputs capitalism could also produce socialism, anarchism, or any other socio-political form, given different conditions. This logic is echoed by Gustav Landauer, who famously asserted in *Call to Socialism* that socialism is not technologically determined but is always possible if "enough people want it"—though its expression may differ depending on material and technological conditions.[17]

Thus, under Scenario A, the UTM is a substrate of radical contingency. Its neutrality means capitalism is a result—but not *the* result—of the machine's generative powers. This reinforces the view that history and technology interact, but that human agency, collective will, and alternative imaginaries remain viable sites of transformation. However, this view of neutrality is directly challenged by the Marxist tradition, which holds that capitalism is not an accidental configuration, but a necessary outgrowth of historical and material conditions. Marx, in *A Contribution to the Critique of Political Economy*, argues that social existence, defined by relations of production, conditions consciousness, not the other way around.[18] Hence, real change can only occur when the underlying social structures (the 'program') are overthrown and rewritten. But if these structures are bound to the logic of the UTM itself, can they ever truly be rewritten?

Scenario B: The UTM as a 'Capitalist Machine'

Premise: This scenario takes a critical turn. It questions the neutrality of the UTM and explores the possibility that its structure is inherently biased towards capitalist outcomes. In other words, could the machine itself be predisposed to favor capitalism; not merely by accident, but by design?

This is not a theological argument—we are not invoking a divine watchmaker—but a secular hypothesis: that the foundational architecture of the computational universe

15 Michael Hardt and Antonio Negri, *Empire* (Cambridge, MA: Harvard University Press, 2000), 187.

16 Ian Angus, "Empire, Borders, Place: A Critique of Hardt and Negri's Concept of Empire," *Theory & Event* 7, no. 3 (2004): 2.

17 Gustav Landauer, *Call to Socialism* (Aspekt B.V., 2022), 36.

18 Karl Marx, "Preface to *A Contribution to the Critique of Political Economy*," in *Marx: Later Political Writings*, ed. and trans. Terrell Carver (Cambridge: Cambridge University Press, 2017), 160.

might structurally reinforce capitalist logics. The question is not simply whether capitalism can emerge from the UTM, but whether it must, given the axioms embedded within the system's design. This scenario draws inspiration from Fredric Jameson, who in *Postmodernism, or, The Cultural Logic of Late Capitalism*, describes how capitalism subsumes all life, converting every act, object, and resistance into commodity form.[19] According to Jameson, even resistance becomes aestheticized and commodified—a logic echoed in postmodern pastiche. If the UTM exhibits a similar logic, then we must consider that the very mechanism meant to model everything might in fact be structured to model only that which conforms to capitalist computation. This leads to a critical dilemma: If the machine through which we understand and critique capitalism is itself structured by capitalist axioms—e.g., accumulation, profit maximization, systemic exploitation—then how can critique be performed from within the system?

This self-referential trap mirrors several philosophical and logical conundrums: (1) Graham Harman's concept of overmining and undermining suggests that any attempt to analyse an object by reducing it to its components or effects ultimately fails to escape its ontological domain.[20] (2) Derrida's "transcendental signifier" points to the impossibility of locating a stable foundation outside the signifying chain, rendering meaning endlessly deferred.[21] (3) Gödel's incompleteness theorem shows that no formal system can prove its own consistency; there are always truths that escape the system's logic.[22] (4) Turing himself, in *Computing Machinery and Intelligence*, underscored the deterministic nature of computation: "It will seem that given the initial state of the machine and the input signals it is always possible to predict all future states."[23] This echoes Laplacian determinism and suggests that if the input conditions of the UTM include the axioms of capitalist rationality, then the outputs will inevitably reflect and reinforce them.

Thus, under Scenario B, the UTM is not a neutral platform but a structuring condition

19 Frederic Jameson, *Postmodernism, Or, The Cultural Logic of Late Capitalism* (Durham, NC: Duke University Press, 1991), 38–45, 48–54.

20 Graham Harman, *The Quadruple Object* (London: Zero Books, 2011), 8–11.

21 Jacques Derrida, *Writing and Difference,* trans. Alan Bass (Chicago, IL: University of Chicago Press, 1978).

22 Kurt Gödel, "Über formal unentscheidbare Sätze der Principia Mathematica und verwandter Systeme I," *Monatshefte für Mathematik und Physik* 38 (1931): 173-198, esp. 173ff. Just as Gödel encoded self-reference into formal systems to produce undecidable statements, a UTM could, in theory, execute a program that tries to directly reference its own operation in such a way that it causes paradoxical results. For instance, a program might issue commands that logically contradict its own continuation (e.g., "halt if you never halt", akin to the classic Liar's Paradox). In computation theory, what is known as the problem of Inconsistent States says that within formal systems, it is possible to encounter self-referential rules that lead to contradictions or undefined states. While a UTM is designed to simulate any computable process, if it attempts to simulate a process that generates logical contradictions, the result would not be the destruction of the UTM per se but rather a state where the program cannot continue in a coherent way (an infinite loop or non-halting state).

23 Alan Turing, "Computing Machinery and Intelligence," *Mind* 59, no. 236 (1950): 440.

of capitalism itself. Capitalism is not one possible result, but the telos encoded in the machine's logic. It is not just an outcome—it is a substrate.

And yet, the machine is not perfect. It contains "blemishes and unpredictabilities". These are the glitches, contradictions, and ruptures—the cracks through which critique and revolt might still operate, albeit from within a system they can never fully exit. But if every gesture of resistance is already anticipated, absorbed, and commodified by the machine—just as Jameson suggests—then we are faced with a near-paradoxical situation: we must use the tools of the system to critique the system, knowing those tools are already implicated. To conclude this section, the two scenarios offer diverging answers to our core hypothesis: can the UTM be interpreted as a capitalist super-machine? Scenario A (Neutral UTM) insists that capitalism is contingent, historical, and one computational possibility among many—its emergence is not structurally determined. Scenario B (Biased UTM) thinks that capitalism is embedded in the UTM's architecture, a privileged and perhaps inevitable output, making critique from within both necessary and compromised. The tension between these scenarios will carry forward into the next section, where we investigate whether such a machine, hypothetical or not, could in fact simulate or generate social logics beyond capitalism, or whether any attempt to think 'outside' it merely repeats its internal programming under a different name.

3. Implications of Both Scenarios

The philosophical implications of these scenarios are profound, and they deserve careful elaboration:

For Scenario A: If the UTM is neutral, then capitalism is not the necessary or ultimate form of social organization. It is one possible configuration among infinite others. This position aligns with theories that treat capitalism as contingent; something that has emerged under specific historical, material, or social conditions, rather than something inevitable or natural. In this light, alternatives to capitalism are not only conceivable but computationally plausible, given different inputs, initial conditions, or 'programming'. Herbert Marcuse's concept of one-dimensional thought supports this view, arguing that technological rationality suppresses alternative imaginaries by presenting capitalism as the only viable option.[24] A "multi-dimensional" mindset, then, would imply the possibility of overcoming these constraints and designing fundamentally different social systems—ones that may still function within the universal logic of computation, yet yield non-capitalist realities.

24 Herbert Marcuse, *One Dimensional Man* (Beacon, 1964), 11-18.

For Scenario B: If the UTM is inherently biased toward capitalism, then capitalism becomes more than just a historically contingent form of social organization. It would imply that capitalism is, in some deeper sense, structurally encoded into the computational logic of the universe itself—privileged, perhaps even inevitable. This reading resonates with a more deterministic view of capitalism as not merely dominant but ontologically grounded. David Harvey, in *The Enigma of Capital*, characterizes capitalism as a "totalizing system" that absorbs and neutralizes alternative logics, folding contradictions such as crisis and resistance back into its own operational code.[25] In this view, the advance of rationalism and abstraction itself—both algorithmic and epistemic—may serve to reinforce, rather than undermine, capitalism's inevitability.

Many interpretations of the Marxist project oscillate between these two scenarios. In *A Spectre, Haunting: On The Communist Manifesto*, China Miéville explores how Marx and Engels' text acknowledges the extraordinary, even awe-inspiring, transformative power of capitalism. Capitalism, as described in the *Manifesto*, reshapes society, labor, and human relationships on a vast scale, even as its internal contradictions like crisis, inequality, and alienation are persistently reabsorbed into its logic. Yet Miéville insists on preserving the radical kernel of the *Manifesto*, rejecting reformist impulses that merely seek to mitigate capitalism's worst effects.[26] For Miéville, the call is not for adaptation but for rupture. In the logic of this paper, his argument begins within the frame of Scenario B—recognizing the resilience and pervasiveness of the capitalist system—but ultimately shifts toward Scenario A, viewing capitalism as a historically contingent arrangement. In this latter framing, capitalism becomes a computationally encoded possibility, but not a necessity; one that could, in principle, be decoded, reprogrammed, and replaced.

4. Broader Reflections

This thought experiment also engages with critiques of capitalism that suggest it has become so deeply ingrained in our way of understanding the world that it seems almost natural or inevitable. In the words of Miéville, it becomes impossible to 'unsee'.[27] By framing capitalism as a kind of program running on a Universal Turing Machine, this idea challenges the notion that capitalism is merely a social construct. Instead, it proposes a radical rethinking: What if capitalism is embedded in the very computational fabric of reality itself, operating as a program whose logic is foundational rather than contingent? This perspective expands from Gilles Deleuze and Félix Guattari's concept of the "machinic" in *Anti-Oedipus: Capitalism and Schizophrenia*, where they describe capitalism as a "desiring-machine," an apparatus that organizes flows of desire and production in

25 David Harvey, *The Enigma of Capital and the Crises of Capitalism* (Profile Books, 2011), 242.
26 See China Miéville, *A Spectre, Haunting. On the Communist Manifesto* (Apollo, 2023).
27 See China Miéville, *The City & The City* (Pan Books, 2009).

ways that align with capital accumulation.[28] Desiring-machines make social life come to life; yet these machines cannot be excluded from the social fabric itself: "There are no desiring-machines that exist outside the social machines that they form on a large scale; and no social machines without the desiring machines that inhabit them on a small scale."[29] Inspired by Žižek, the allusion to an all-encompassing capitalism in Deleuze and Guattari's view might be captured through a visual metaphor: we are living inside a box shaped by capitalist systems and desires—not merely as a mental image, but as a structural condition that determines the boundaries of reality itself.[30] The real illusion, however, is not that we can transcend the box and triumphantly declare its boundaries as false. Rather, the grand illusion is that the guiding principle of this box lures us into believing there *is* a possibility of escape (see Fig. 1). This is where the subversive power of "schizophrenia" emerges: despite being labeled as delusional, the schizophrenic persists in acknowledging two realities—one inside and one outside the box—living in a constant state of breach, beyond the comfort of the desiring-machine.

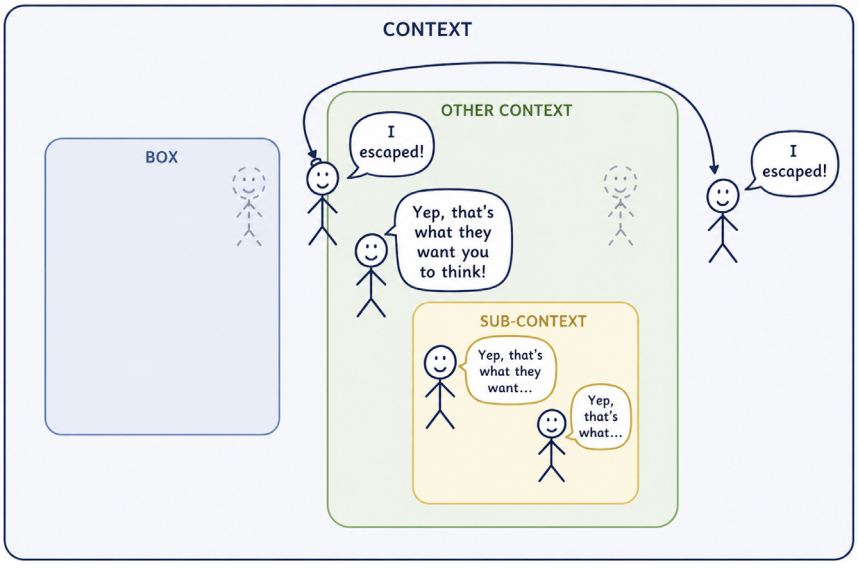

Fig. 1: Box-in-a-box argument

28 Gilles Deleuze and Felix Guattari, *Anti-Oedipus: Capitalism and Schizophrenia*, trans. Robert Hurley, Mark Seem, and Helen R. Lane (Penguin, 2009), 1–4, 340.

29 Deleuze and Guattari, 340.

30 See Slavoj Žižek, *Welcome to the Desert of the Real* (Verso Books, 2002).

In *Grundrisse* (especially the "Fragment on Machines"), Marx engages with the idea of machinery in a more speculative way, beyond their immediate industrial routine.[31] Here, he delves into the relationship between technology and human labor, considering how machines transform the labor process and the broader implications for capitalism and human society. He theorizes that as machines become more advanced and perform more complex tasks, they could reduce the need for human labor, leading to what he calls "the general intellect." Marx was very much influenced by a pioneering 1824 book by utopian socialist William Thompson, lengthy and sanguinely titled *An Inquiry into the Principles of the Distribution of Wealth Most Conducive to Human Happiness, Applied to the Newly Proposed System of Voluntary Equality of Wealth*.[32] "The general intellect" refers to the collective knowledge and technological capacities of society, which machines can embody and operationalize. Marx also reflects on how machines serve as an extension of capitalist power. Instead of being mere tools, they become central to the capital accumulation process, enabling capitalists to extract surplus value more efficiently. In this sense, the machine represents the alienation of human labor, as workers become more dependent on technology that is owned and controlled by the capitalist class. On a more abstract note, Marx's writing in *Grundrisse* anticipates debates about automation, cybernetics, and the mechanization of life itself.[33] This speculative take on machines as part of a system of social control and transformation resonates with the "desiring-machines" of Deleuze and Guattari that we touched upon before.

Coming back to the UTM as a Capitalist Machine, it might be seen as a metaphor for the underlying logic of a system that continually produces and reproduces capitalist relations, including the "molar machines" of desire that Deleuze and Guattari talk about as well as the automation of intellectual labor that Marx dealt with in *Grundrisse*—even in digital or computational terms. It also raises questions about agency and determinism: If capitalism is just one of many possible outcomes of this universal computational structure, then human

31 Marx, *Grundrisse*, 704–706. In the chapter on "Machinery and Large-Scale Industry", in *Capital, Volume I*, Marx discusses how machines, such as the steam engine or power loom, were introduced into factories to increase productivity by speeding up the production process and reducing the reliance on skilled labor. This led to the alienation of workers from their labor and the commodification of human activity. Later, Marx turns to machines as repositories of human knowledge and creativity, marking the shift towards an information-driven economy, as elaborated in *Grundrisse*: "Nature builds no machines, no locomotives, railways, electric telegraphs, self-acting mules, etc. These are products of human industry; natural material transformed into organs of the human will over nature, or of human participation in nature. They are organs of the human brain, created by the human hand; the power of knowledge, objectified." (706).

32 Matteo Pasquinelli, "On the Origin of Marx's General Intellect, *Radical Philosophy* 206 (Winter 2009): 10–12, 16–18.

33 See Antonio Negri, *Marx Beyond Marx: Lessons on the Grundrisse*, trans. Harry Cleaver, Michael Ryan, and Maurizio Viano, ed. Jim Fleming (Pluto, 1991), 139–147; Nick Dyer-Witheford, *Cyber-Marx: Cycles and Circuits of Struggle in High-Technology Capitalism* (University of Illinois Press, 1999), 71–80; Paolo Virno, "General Intellect," *Historical Materialism* 15, no. 3 (2007).

agency, creativity, and resistance retain significant roles in shaping future possibilities. But if capitalism is inherently coded into the universe's structural 'software', then the machine's program preordains capitalist outcomes, suggesting a deeply deterministic universe where alternative social structures are systematically foreclosed. As Derrida has noted in his reflections on technology, the machine is not a neutral tool; it has its own metaphysical project.[34] However, this point becomes moot if the 'machine' Derrida refers to is merely one instantiation—or iteration—of the capitalist UTM, continually advancing its output through history while serving as the true cradle of the "metaphysical project." The critical issue raised here is whether we engage only with the level of data—the symbolic outputs and measurable effects—or if we dare confront the program itself, the underlying code and architecture that generates it.

Nick Bostrom's so-called "simulation theory" presents an intriguing—and entertaining—dimension to this discussion. According to Bostrom, we may be living in an advanced computer simulation created by a post-human civilization.[35] In this framework, our experiences, choices, and even our identities could be the products of sophisticated programming rather than intrinsic realities.[36] If we accept the premise that we might be living in such a simulation, it invites a profound inquiry: Who or what is the 'programmer' of this simulation? Could this programmer be analogous to the capitalist system itself, suggesting that our perceived reality is not neutral but explicitly shaped by capitalist logic? If we view the capitalist system as analogous to a computer program or simulation, the programmer could be interpreted as the capitalist machine itself—or more precisely, the configuration of the Universal Turing Machine within a proto-capitalist framework. This view is supported by the Marxist notion of structural domination (and the abstraction of labor) that is not immediately visible but is embedded within the logic of the system itself;[37] what Lenin would later refer to as "ideology." In Marxist economics, labor becomes abstract when it is reduced to a mere quantity of value, detached from the concrete activities and skills of individual workers; what Søren Mau calls the "socio-economic power of capitalism."[38] In this scenario, the UTM, as a metaphysical construct, would not merely be an abstract computational model but an embodiment of capitalist principles that shape our simulated reality. To put this in other words, the machinery of capitalism cannot be reduced merely to monetized or quantifiable elements prepared for symbolic exchange, akin to computerized data. Instead, it is far more comprehensive and is subsumed within the framework of an infinite information-processing machine, a

34 Jacques Derrida, "Nietzsche and the Machine," *Journal of Nietzsche Studies*, 7 (1994): 7.

35 Nick Bostrom, "Are You Living In a Computer Simulation?" *Philosophical Quarterly* 53, no. 211 (2003): 243–245.

36 David Chalmers, *Reality+: Virtual Worlds and the Problems of Philosophy* (Norton, 2022), 9–17.

37 Simon Mohun, "Productive and Unproductive Labor in the Labor Theory of Value," *Review of Radical Political Economics* 28, no. 4 (1996): 30–34.

38 Søren Mau, *Mute Compulsion: A Marxist Theory of the Economic Power of Capital* (Verso, 2023), 1–4.

universal computational substrate whose fundamental code is capitalism itself.

This perspective proposes that capitalism is not just a social or economic system (simulated or real) but an integral part of the very structure of our existence. If capitalism functions as a form of metaphysical architecture, then the UTM is not merely an abstract computing model but a concretely configured capitalist super-machine, its software encoding capitalist relations and values at the core. This configuration could manifest in various ways: through the organization of desires, the structuring of resources, the propagation of ideologies that align with capitalist accumulation and exchange, or even through what Mikkel Bolt has described as the "image processing" calculus of capitalism: almost every image of the world we are confronted with carries a capitalist stance, detected or not.[39] Of course, the idea of capitalism as a metaphysical system intersects with broader philosophical discussions about the nature of reality and human perception.[40] If capitalism is ingrained in the UTM's structure, it might imply that our understanding of the world is fundamentally shaped by capitalist principles. This view aligns with philosophical critiques that question the neutrality of technology and systems, suggesting instead that they carry inherent biases and projective frameworks. As Derrida observed in his *Paper Machine*, the machine is not a neutral tool but a bearer of its own ontology.[41] Thus, if the UTM is a capitalist-infused entity, it represents a metaphysical dimension of capitalism on the ontological level that permeates our experience and understanding of reality, akin to a truly effective ideology. In his reading of Marx, Louis Althusser describes ideology as the imaginary construction whose status is exactly like the theoretical status of the dream,[42] and Slavoj Žižek insists that ideology is not an illusion that masks the real state of things, but an invasive conviction that consists of the fantasy that structures our own social reality.[43]

In this broader reflection, the implications are weighty. It challenges the possibility of escaping capitalist logic, suggesting that any attempt to conceive alternative social structures must contend with the deeply embedded nature of capitalism in our simulated or computational reality. This perspective not only raises questions about agency and resistance but also about the very possibility of envisioning a reality beyond the constraints of capitalist metaphysics.

39 See Mikkel Bolt Rasmussen, *Crisis to Insurrection: Notes on the Ongoing Collapse* (Minor Compositions, 2015).

40 See Andrew Feenberg, *Questioning Technology* (Routledge, 1999), 1–6; Graeme Kirkpatrick, *Technology and Social Power* (Bloomsbury, 2008), 1–9; Stig Børsen Hansen, *Philosophers of Technology* (De Gruyter, 2022), 1–7.

41 See Jacques Derrida, *Paper Machine*, trans. Rachel Bowlby (Stanford University Press, 2005).

42 Louis Althusser, *For Marx*, trans. Ben Brewster (Verso, 2005), 232–240.

43 See Slavoj Žižek, *Looking Awry: An Introduction to Jacques Lacan through Popular Culture* (The MIT Press, 1992).

The 1997 film *Cube* offers a powerful cinematic illustration of this hypothesis. The film depicts a group of people trapped in a gigantic, labyrinthine structure composed of cube-shaped rooms. Each room contains deadly traps that the occupants must navigate to survive. Crucially, the architecture of the cube is algorithmic and systemic: it functions like a gigantic computational machine—one that regulates, disciplines, and exploits human labor and life itself in an unrelenting manner. In this sense, *Cube* is a vivid and visceral metaphor for the capitalist super-machine described above. Let's unpack this, bit by bit: (1) The cube's design is cold, mechanical, and impersonal, reflecting the abstraction and alienation characteristic of capitalist machinery. (2) The people inside the cube have little agency or knowledge of the system they are trapped within; they are subjected to its logic without comprehension or control, akin to workers within capitalist production who are alienated from the means and purpose of their labor[44] (3) The cube's traps represent the deadly consequences of missteps within the system, mirroring the precarity and risk that capitalism imposes on individuals. (4) The invisible programming of the cube's structure—the logic determining which rooms are safe and which are fatal—embodies the hidden 'code' or capitalist algorithm governing social relations. (5) Finally, the prisoners' attempts to navigate and escape the cube parallel acts of resistance and attempts to understand and subvert the capitalist system, albeit within a framework that is fundamentally hostile to their survival and freedom.

Hence, *Cube* does not simply serve as an allegory; it concretely enacts the workings of the capitalist super-machine. It makes visible the 'invisible hand' of capital as a brutal, calculating system, indifferent to human life and governed by a strict logic of control and extraction. This cinematic representation embodies the UTM metaphor: the cube is a physical instantiation of the capitalist computational program, endlessly cycling through its processes, producing outcomes (life or death) based on the input and 'state' of those trapped within it. As such, the film exemplifies the intersection of capital's abstract 'program' with material conditions and lived experience.

5. Concluding remarks

The technocriticism explored here—one that hypothesizes the expansion of the Universal Turing Machine as a catalyst for capitalist socio-economic determinism—challenges us to view capitalism not merely as a social or fiscal system but as a computational phenomenon potentially woven into the very fabric of reality. This perspective opens a space for considering whether capitalism is an accidental emergent property of a neutral computational process or an inevitable consequence of the universe's inherent

44 See Bo Kampmann Walther, "The Ontology of Virtual Space: In Search of Matrixes and Cube-Machines," in *Virtual Space Construction: The Spatiality of Virtual Inhabited 3D Worlds*, ed. Lars Qvortrup (Springer Science & Business Media, 2002).

computational structure, as we saw in the discussion of the two scenarios. Consequently, it prompts a re-examination of both our understanding of technology and the social systems it may generate or perpetuate. To conclude this investigation and tentatively invite further critique, we will examine whether the capitalist UTM operates according to a procedural or prescriptive dynamic and explore the implications of this in terms of normativity and agency.

When viewing the Universal Turing Machine in procedural terms, we could focus on its ability to simulate any process through a set of rules and sequences. This perspective aligns with what media theorist Ian Bogost calls "procedural rhetoric" —the way systems and rules structure how tasks are executed.[45] The UTM, like procedural systems, offers a framework where the operation of any algorithm is reduced to the execution of mechanical, predetermined steps, indifferent to context or human intent. In this sense, the UTM mirrors capitalism's procedural efficiency, where labor, production, and consumption are regulated through abstract systems of value, detached from the individuals performing them.

Viewing the UTM in prescriptive terms, on the other hand, shifts the focus from the execution of processes to the imposition of directives. The UTM does not merely simulate machines; it also encodes and dictates how machines should behave, reflecting how capitalism, through prescriptive norms, not only facilitates but also defines what constitutes legitimate economic activity. This is akin to what Derrida refers to as the "force of law"—an a priori force that is both enforcing and authoritative, deemed "just" even when it is deemed unjust).[46] In prescriptive terms, the UTM could be seen as imposing the very structure that governs labor, computation, and production, acting as a capitalist super-machine by prescribing the 'correct' way tasks must be completed.

Both procedural and prescriptive views of the UTM as a capitalist super-machine lead to the obliteration of normativity and agency, two concepts central to dialectical materialism. In procedural terms, the machine's execution of tasks is entirely mechanical, eliminating any notion of human agency or ethical decision-making in favor of predetermined rules. Labor, in this system, becomes dehumanized, as human choice is replaced by the abstract logic of capital. Similarly, in prescriptive terms, the UTM becomes a vehicle for imposing external norms on individuals, dictating behaviour without room for collective political will or moral consideration. Both stances efface the normative potential for workers or agents to transform the system or assert their autonomy, reducing them to mere executors of predefined scripts. In Marxist terms, this represents a collapse of dialectical agency,

45 Ian Bogost, *Persuasive Games: The Expressive Power of Videogames* (MIT Press, 2007), 1–5.

46 See Jacques Derrida, "Force of Law: The Metaphysical Foundation of Authority," in *Deconstruction and the Possibility of Justice*, ed. Drucilla Cornell, Michel Rosenfeld, and David Gray Carlson (Routledge, 1992), 3–5.

the possibility of praxis and change through human struggle, as the machine logic of capitalism becomes a totalizing force that renders both human creativity and normative critique irrelevant. As we have seen several times, what would be rendered contingent, once the machine is executing its program, possibly shaping crises and mutinies, merely shows itself on the level of data, and not in the algorithmic source code feeding the program underneath it.

Now, to finalize this section, let's scrutinize the potential consequences of running the capitalism program on a yet to be built (but blueprinted) quantum computer. Drawing on the many-worlds interpretation (MWI) of quantum mechanics, introduced by Hugh Everett III in 1957 and later expanded by David Deutsch, Bryce DeWitt, and Max Tegmark, one can imagine a scenario where the 'output' of capitalism is not singular or predetermined, but rather a superposition of multiple socio-economic systems existing across parallel universes.[47] Superposition refers to the quantum property that allows particles to exist in multiple states simultaneously. Rather than having a definite state (like a classical bit being either 0 or 1), quantum bits, or qubits, can exist in a combination of both 0 and 1 states simultaneously.[48] This property is what makes quantum computing so powerful: instead of processing information sequentially, as classical computers do, quantum computers can process multiple possibilities at once by harnessing this parallelism.

However, it is important to acknowledge Philip Ball's critical analysis in *Beyond Weird: Why Everything You Thought You Knew About Quantum Physics Is Different*, which challenges the ontological status and physical plausibility of the many-worlds interpretation. Ball argues that the Many-Worlds Interpretation (MWI) remains not only highly speculative and philosophically contentious rather than an empirically established fact, but also that it aligns with what he calls the "tired clichés" surrounding popular misconceptions of quantum theory—particularly regarding what it is, and crucially, what it is not.[49] Thus, while MWI provides a provocative metaphor for capitalism's persistence and multiplicity, its use here should be read as an illustrative hypothesis rather than definitive physics. This caution tempers any deterministic reading of multiversal capitalism and encourages us to consider the ideological work that such analogies perform in our contemporary political-economic discourse.

In Scenario A, where socio-economic capitalism is one of many possible outcomes, the

47 See David Deutsch, *The Beginning of Infinity* (Penguin Books, 2011), 279–296; Bryce DeWitt, *The Global Approach to Quantum Field Theory* (Oxford University Press, 2014), 1–5; Max Tegmark, *Our Mathematical Universe: My Quest for the Ultimate Nature of Reality* (Knopf, 2014), 303–323.

48 Michael A Nielsen and Isaac L. Chuang, *Quantum Computation and Quantum Information* (Cambridge University Press, 2010), 27–35.

49 Phillip Ball, *Beyond Weird: Why Everything You Thought You Knew About Quantum Physics Is Different* (Vintage, 2018), 311–316.

computational process mirrors quantum superposition, wherein each potential output—whether capitalist, socialist, or otherwise—exists simultaneously across different universes. Quantum computing, which utilizes qubits to process information across superpositions, could, in this framework, retrieve and calculate data from multiple universes at once, creating a non-deterministic landscape where capitalism is contingent upon initial conditions and the choice of universe that the system collapses into. On the other hand, Scenario B aligns with a more deterministic multiverse hypothesis, where capitalism emerges as an inevitable and privileged outcome. Here, the algorithms governing the UTM could be structured in such a way that, despite the parallel computations and multiverse interactions, the system's underlying rules—its capitalist 'axioms'—lead to a convergence across universes, solidifying capitalism as the default socio-economic structure. Deutsch's theory of quantum computation, which posits that quantum computers could perform tasks by leveraging interference between parallel universes,[50] suggests that even when multiple possibilities exist, the underlying architecture of the UTM could reinforce capitalist principles across these worlds, rendering capitalism not only resilient but pervasive across the multiverse.

But it doesn't end here. Quantum entanglement adds another layer of complexity.[51] When particles are entangled, their states become correlated, such that the state of one particle instantaneously affects the state of the other, regardless of distance. In the context of a quantum UTM, socio-economic systems across different universes could be entangled, meaning changes in one universe (or economic system) could influence the others. This raises the drab prospect that crises and contradictions inherent to capitalism might not only spread within a single universe but could propagate across parallel realities, reinforcing capitalist structures and preventing meaningful escape or transformation even across multiple worlds. Furthermore, the notion of probability is central here. In quantum mechanics, outcomes are probabilistic rather than deterministic.[52] If we view the UTM as operating through a quantum framework, each socio-economic system has a certain probability of being realized. In Scenario A, these probabilities might be more evenly distributed, meaning there is hope for a diverse array of socio-economic systems to emerge. However, in Scenario B, if capitalism's axioms—profit maximization, competition, global abstraction, and exploitation of labor—are deeply embedded in the UTM's algorithmic structure, the probability of capitalism's dominance might approach certainty, with other systems becoming vanishingly rare.

This, then, leads to an even more bleak prospect when considering Marx's insight into capitalism's crises and contradictions. As we saw earlier, Marx argued that capitalism inherently produces its own crises—recessions, financial collapses, and social

50 Deutsch, 279–296.

51 Jed Brody, *Quantum Entanglement* (MIT Press, 2020), 1–6.

52 John Watrous, *The Theory of Quantum Information* (Cambridge University Press, 2018), 1–9.

inequalities—due to its internal contradictions. These crises, in classical Marxist theory, are seen as potential openings for revolutionary change, as they expose the system's failings. However, if the UTM, operating under quantum principles, is predisposed to output capitalism not only in our universe but across many parallel worlds, these crises might not lead to meaningful change. Instead, they could be smoothed out or entangled with other universes, resulting in a self-reinforcing system where capitalism perpetuates itself across realities, never fully collapsing despite its internal contradictions.[53] According to Harvey, the fundamental theoretical conclusion of the modern history of capitalism is that "capital never solves its crisis tendencies, it merely moves them around."[54] In the movie *Cube*, as we saw, this corresponds to the cube's algorithm—its fundamental principles of motion—which has already integrated attempts at its destruction, whether from external forces or from individuals within the cube itself, as part of its life-sustaining design. It also mirrors the "anomaly" that Neo encounters in *The Matrix: Reloaded* (2003), which doesn't breach the AI stranglehold but instead strengthens it.

In such a multiversal framework, capitalism's crises become an inevitable part of its scheme, but they are not fatal; they are absorbed and neutralized by the broader structure, much like how quantum systems exhibit resilience and continuity through entanglement. This scenario amplifies the deterministic horror of capitalism being inescapable, not just within our own reality but across the multiverse. Even if one universe experiences a severe crisis or collapse, others may remain stable, sustaining the capitalist machine across dimensions.

This leads us to reflect on why a computational capitalism might compulsively simulate itself across these possibilities. One hypothesis is that such simulation functions as a form of self-preservation: capitalism's algorithmic core perpetuates its own existence by continuously testing, iterating, and adapting across different 'worlds' or contexts. This compulsive reproduction could be understood as an ideological imperative embedded in the digital capitalist drive: the relentless expansion and replication of capital not only maximizes profit but secures systemic survival against crises and opposition. From this vantage, the capitalist super-machine's simulation is less about neutral computation and more about a hegemonic process that co-opts computational logic to naturalize and enforce capitalist norms across scales and dimensions.

Finally, the ideological valency of this article itself must be acknowledged. Writing about capitalism as a computational super-machine—especially invoking quantum

53 This aligns with the cynical moral of Deleuze and Guattari's *Anti-Oedipus*. Although the "schizophrenic" is depicted as a utopian figure who non-conformingly navigates the boundaries of the capitalist spectacle, he ultimately mirrors the madman in the Greek Liar Paradox, who claims to be *really* telling the truth while insisting that all Cretans are liars.

54 Harvey, *The Enigma of Capital*, 11.

metaphors and multiversal speculation—positions the discourse within a broader field of contemporary digital capitalism critique. In a world where digital capitalism faces mounting oppositions, from data sovereignty movements to platform cooperativism and digital commons struggles, this kind of analysis risks being co-opted or dismissed as 'clever speculation' if it does not engage with concrete material practices and political possibilities. The article thus serves as both a warning and an invitation: while it diagnoses the totalizing logic of computational capitalism, it also calls for renewed attention to the potential cracks and points of rupture where human agency, solidarity, and alternative imaginaries might emerge.

To conclude, the UTM as a capitalist super-machine is neither simply procedural nor prescriptive; rather, it embodies both, operating as a computational system that simulates and enforces capitalist norms, often with the appearance of inevitability and necessity. The metaphor of quantum computation extends this picture to a multiverse where capitalism's logic propagates across realities, making its escape or transcendence an elusive prospect. As illustrated in the film *Cube*, attempts to dismantle such a system risk becoming subsumed by it, absorbed into the very processes that sustain it. Yet, recognizing this might also spur new forms of resistance, political, conceptual, and technological, that challenge the UTM's claim as a universal capitalist machine.

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