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ESSAY

(Un)Natural language: An art software captures underlying ecological threats in documents

Peijing Mou [a]

[a] University of California, Los Angeles. United States of America
Email address: art@melodymou.com

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Abstract
This article introduces *(Un)Natural Language*, an art software and an interactive online archive that documents and examines how words make worlds by capturing the underlying ecological threats in government project documents. The project weaves together ecology, linguistics, and computational technology to offer a new analytical lens for language use in urbanization. Through a custom-labeled dataset and a fine-tuned BERT model, the system classifies individual sentences in project appraisal documents, returning visualized analyses that reveal patterns of pro-growth and ecologically detrimental discourse. Merging net art, environmental activism, and natural language processing, *(Un)Natural Language* offers a novel framework for interpreting public documents by uncovering hidden narratives of extractivism and economic expansion. The article begins by outlining the context and concepts of the work, followed by a description of its operation, design, and technical implementation. It concludes with reflections on the project's contributions to ecolinguistics, machine learning, and net art. The project reclaims computation as a space for reflection rather than control—inviting viewers to rethink the language shaping our ecological futures.

1. Introduction

What narratives lie buried beneath the gridlines of urban development, within the margins of policy and loan documents, or in the silences surrounding ecological impact? What stories are concealed within the public language of government in service of economic growth? *(Un)Natural Language* is an art software, as well as an interactive online archive, that examines and documents how words make worlds by capturing the underlying ecological threats in government project documents. It is an experimental project weaving ecology, linguistics, and computational technology together to create a new analytical lens for wicked problems in urbanization related to water, rivers, and oceans. *Wicked problem* is a term used to describe complex issues that defy clear definitions, resolutions, or definitive

solutions (Rittel & Webber, 1973). Science was, according to Rittel and Webber (1973), designed to address "tame" problems: those that are well-defined and solvable within a controlled framework. By contrast, conflicts within urbanization demand interdisciplinary approaches that integrate diverse knowledge systems to address their inherent complexity since there is no definitive formulation, conceivable solutions, or stopping rule to them. Integrating multiple fields and perspectives through interdisciplinary research offers a fresh lens through which to confront these complex challenges.

As a researcher and a media artist, I see interdisciplinary art as an advanced experimental space—one that not only interrogates reality but actively intervenes in it, offering creative responses to wicked problems. In this project, I ask: What roles can art and technology play in imagining alternatives to a post-development world? This work collected government documents, forming a sequence-based dataset that is labeled with three specific categories: pro-growth, ecologically dominating, and neutral. A language model is subsequently trained on this dataset to detect sentences that embody growth-oriented and extractive ideologies. In doing so, it reveals the hidden assumptions in government texts by tracing the linguistic fingerprints of ecological narratives embedded in urban water governance, management, and development. By reframing computation as a reflective rather than exploitative tool, this work offers an alternative application of computing, creating new ecological discourses that critically reflect on water urbanization. The project is guided by a degrowth-oriented commitment—not as a call for economic reduction, but as an ethical and imaginative withdrawal from growth narratives and the ideology of domination. Degrowth here operates as a value system that repositions and decentralizes computation as a site of care rather than extraction and control. It actively rejects economic growth as the sole measure of social well-being, emphasizing ecological limits, social equity, and the rights of more-than-human worlds.

As Donna Haraway (2016, p.12) writes, "it matters what stories we tell to tell other stories with; it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories." This work expands the possibilities for public engagement with language as an active ecological force, illustrating how words can shape, distort, and potentially heal our

relationship with the environment. This article will present a working ecological natural language processing system that operates both as a critical research tool and as an experiential platform for gallery audiences, contributing to net art, environmental activism, and pedagogy. By lifting the veil of bureaucratic language, it empowers viewers and users to recognize, question, and reimagine the hidden ideological structures shaping ecological discourse through a degrowth lens.

This paper is divided into four parts. The first part introduces the context of the project and outlines the key concepts of pro-growth and ecological domination. The second part details the operation and functionality of the interactive archive, explaining how users engage with the website to explore the analyzed documents. The third part, which delves into functional details and technical specifics introduces dataset design, labeling, model training, and algorithmic processes. The last part situates the contributions of this project in ecology activism, net art, and natural language processing.

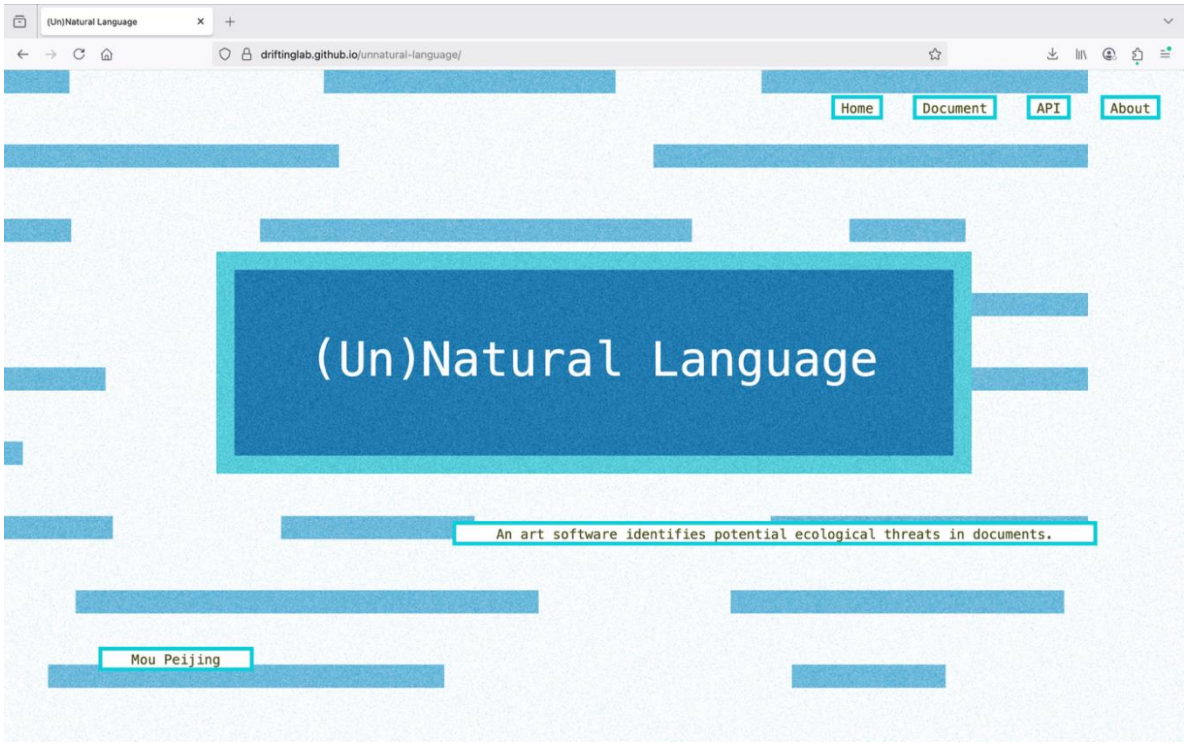


Fig. 1. Online Archive - Home page. Image credit: Artist. © 2025 Mou Peijing

2. Background and Related Work

Ecological linguistics, or ecolinguistics, expands sociolinguistics by situating language within broader ecological contexts—bridging social, environmental, and interspecies dimensions of discourse. A key practice within this field is eco-critical discourse analysis (eco-CDA), which critically examines how language perpetuates or challenges ecologically harmful ideologies (Zhang et al., 2023). Halliday (1990) was among the first to encourage applied linguists to confront urgent ecological issues, identifying "economic growth" narratives as central culprits: countless global texts, he noted, reinforce the notion that "growth is good, bigger is better," thereby normalizing ecological degradation. Building on this, Stibbe (2015) developed an analytical framework intertwining language critique with ecological consciousness, emphasizing how linguistic patterns shape environmental imaginaries and contribute to either harm or healing.

Ecolinguistic research primarily focuses on small-scale, manual critical discourse analyses of texts, often requiring deep domain expertise and significant time investment. Whilst essential for a nuanced understanding of texts, this manual method limits the scale and speed at which ecological narratives in large institutional documents can be systematically identified and challenged.

In parallel, computational methods such as Natural Language Processing (NLP) and Machine Learning (ML) have rapidly evolved, offering powerful tools for language generation (e.g., ChatGPT), translation (e.g., Neural Machine Translation), classification, and summarization. However, in mainstream narratives, these technologies are overwhelmingly framed as instruments for development, optimization, and governance efficiency. Crawford (2021) demonstrates that AI systems are deeply entangled with forms of environmental harm, labor exploitation, and state power. In Atlas of AI, she traces how artificial intelligence relies on extractive infrastructures—strip mining for computational materials, exploitative labor conditions, and the commodification of personal data. Phrases like "AI optimizes resource use," "ML predicts system failures," and "AI enables smart governance" have become common in the use of public language, embedding a technocratic logic that frames natural and social systems as entities to be forecasted, optimized, and managed.

Despite their technical promise, these computational approaches often reinforce the very ideologies that ecolinguistics seeks to critique. For critical ecological reading, there is a notable gap in leveraging NLP and ML to interrogate the language of governance rather than serve it. Only a very small number of studies have attempted to operationalize ecological discourse analysis through machine learning—such as Zhang, Sandaran, and Feng's (2023) deep-learning–based analysis of ecological discourse in news media—which demonstrates the potential of computational tools, but also showcases their limitation in scale, scope, and public accessibility. Thus, few projects attempt to operationalize eco-critical discourse analysis at scale by combining close reading sensitivity with the speed and scale made possible by computational tools.

Artists working at the intersection of technology and ecology have developed critical practices that subvert the dominant narratives of data and computation. Since the 1990s, artists have reimagined technical systems as platforms for ecological and political intervention. For example, Natalie Jeremijenko's participatory environmental works pioneered the use of digital tools and networked interactions to engage the public with issues of urban ecology and multispecies relations (Postmasters Gallery, n.d.). Hans Haacke's decades-long practice employed kinetic systems and information-based installations to expose political and environmental power structures (Griffin, 2004) More recent projects (Fig. 2) such as Tega Brain's *Intergovernmental Panel on Capitalism* (2015) and *Synthetic Messenger* (2021), continue this trajectory by intervening in digital infrastructures to reveal the hidden ecological and economic logics embedded in media systems. Anna Tsing's *Feral Atlas* (2021) further expands this field by creating a collaborative browser-based atlas that maps the entangled effects of capitalist infrastructure and ecological disturbance, inviting users to explore more-than-human world-making through interactive research-based storytelling. Together, these works demonstrate how net art and ecological art converge to transform computational systems into critical terrains for ecological reflection and resistance.

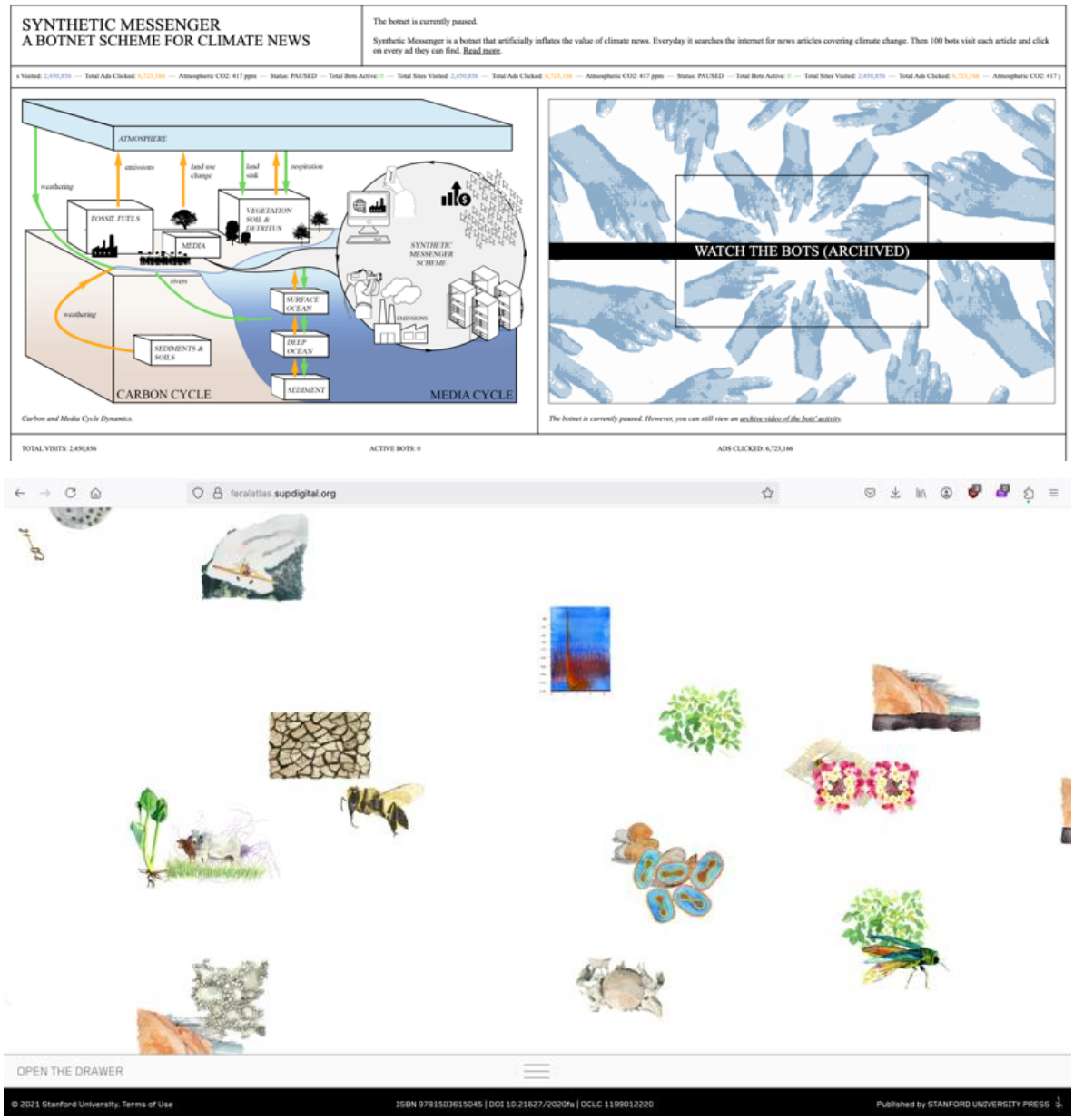


Fig. 2. Tega Brain's (2021) Synthetic Messenger & Anna Tsing's (2021) Feral Atlas. Image credit: Screenshots from project websites. © Tega Brain and Anna Tsing

In alignment with this critical and artistic practice, *(Un)Natural Language* addresses social and ecological concerns by offering a system capable of both close and distinct reading for public documents: it can analyze individual sentences with critical ecological sensitivity, while simultaneously scanning vast corpora of bureaucratic documents at high speed. It opens a new path for computational ecolinguistics—one that embraces degrowth ideology and challenges the anthropocentric desire to expand, optimize, and control.

3. (Un)Natural Language Project

3.1. Concept

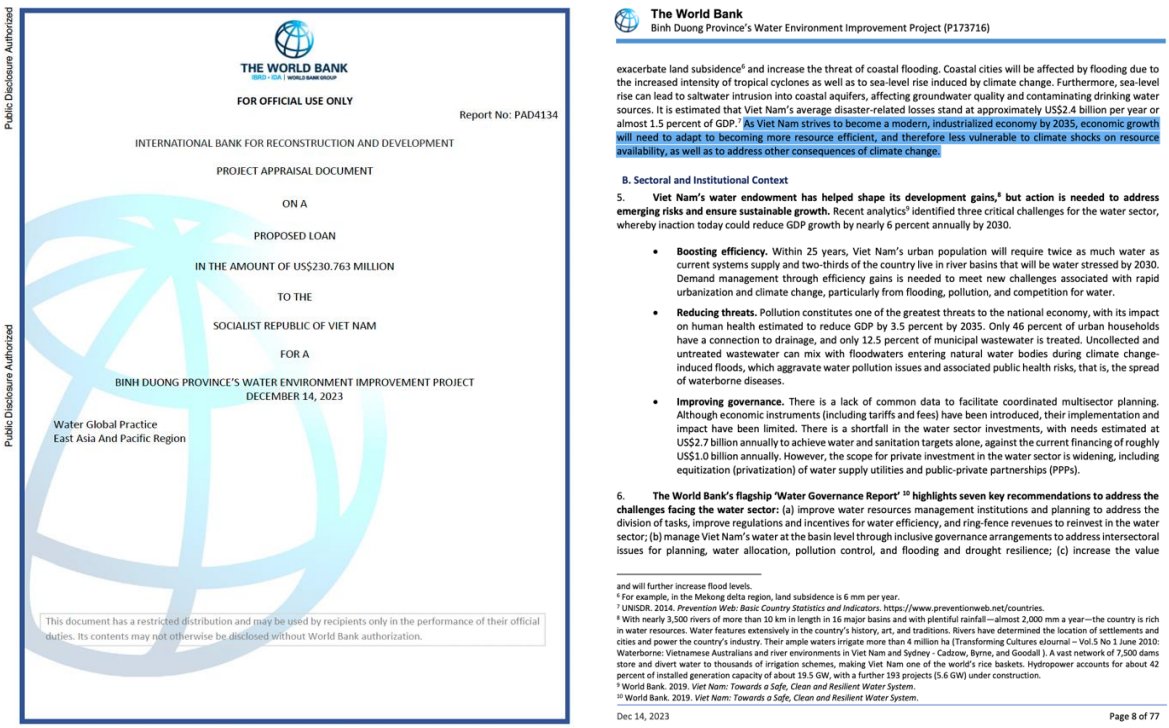
(Un)Natural Language carries a dual meaning. It critiques the ideological constructions hidden within so-called "natural language," while simultaneously referencing NLP—the ML technology that enables computers to interpret, manipulate, and process human language. This project collects program appraisal documents from the World Bank, which detail program descriptions, implementation plans, frameworks, and assessments particularly for hydrology-related projects such as water security and water management. A close reading of these documents reveals that the language employed is far from neutral; rather, it carries implicit ideological assumptions often overlooked in bureaucratic discourse. Specifically, it reflects a capitalist mindset that privileges economic expansion over relational forms of development or alternative ways of living. To excavate these hidden narratives, this project systematically labels each sentence before training a language model into three categories: pro-growth, ecologically dominating, and neutral. In the following paragraphs, I unpack each of these categories.

Fig. 3. Dual visualization of the title. Image credit: Artist. © 2025 Mou Peijing

Growth, as Hickel (2020) observes, is the ideological core of capitalism driven by accumulation, commodification, and colonization. Growth hegemony refers to the cultural dominance of this ideology, often concealed within grand narratives of technological advancement and even within sustainability rhetoric. As the weapon of growth hegemony, pro-growth language constructs a dominant narrative in which economic expansion is framed as inherently positive and desirable. It demands increased material and energy, exacerbating ecological degradation while masking harm behind sugar-coated commitments. Beyond surface promises, the construction of language reflects deeper anthropocentric and capitalist logics subtly shaping public perception. For decades, we have been conditioned to believe that growth is inevitable, and that technological innovation can

resolve ecological crises. Thus, critically identifying the ideological assumptions in public project documents is essential to resist the silent reproduction of growth-driven worldviews.

For instance, the World Bank (2023, p. 8) states in the *Viet Nam Binh Duong Province's Water Environment Improvement Project* that "As Viet Nam strives to become a modern, industrialized economy by 2035, economic growth will need to adapt to becoming more resource efficient, and therefore less vulnerable to climate shocks on resource availability…" While mentioning resource efficiency, the statement reinforces growth as an unquestioned national goal. Here, climate vulnerability is rhetorically mobilized to legitimize the continuation of a growth-oriented agenda—reproducing growth hegemony under the guise of environmental concern.



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Report No: PAD4134

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED LOAN

IN THE AMOUNT OF US$230.763 MILLION

TO THE

SOCIALIST REPUBLIC OF VIET NAM

FOR A

BINH DUONG PROVINCE'S WATER ENVIRONMENT IMPROVEMENT PROJECT

DECEMBER 14, 2023

Water Global Practice
East Asia And Pacific Region

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The World Bank
Binh Duong Province's Water Environment Improvement Project (P173716)

exacerbate land subsidence[6] and increase the threat of coastal flooding. Coastal cities will be affected by flooding due to the increased intensity of tropical cyclones as well as to sea-level rise induced by climate change. Furthermore, sea-level rise can lead to saltwater intrusion into coastal aquifers, affecting groundwater quality and contaminating drinking water sources. It is estimated that Viet Nam's average disaster-related losses stand at approximately US$2.4 billion per year or almost 1.5 percent of GDP.[7] As Viet Nam strives to become a modern, industrialized economy by 2035, economic growth will need to adapt to becoming more resource efficient, and therefore less vulnerable to climate shocks on resource availability, as well as to address other consequences of climate change.

B. Sectoral and Institutional Context

5. **Viet Nam's water endowment has helped shape its development gains,[8] but action is needed to address emerging risks and ensure sustainable growth.** Recent analytics[9] identified three critical challenges for the water sector, whereby inaction today could reduce GDP growth by nearly 6 percent annually by 2030.

- **Boosting efficiency.** Within 25 years, Viet Nam's urban population will require twice as much water as current systems supply and two-thirds of the country live in river basins that will be water stressed by 2030. Demand management through efficiency gains is needed to meet new challenges associated with rapid urbanization and climate change, particularly from flooding, pollution, and competition for water.
- **Reducing threats.** Pollution constitutes one of the greatest threats to the national economy, with its impact on human health estimated to reduce GDP by 3.5 percent by 2035. Only 46 percent of urban households have a connection to drainage, and only 12.5 percent of municipal wastewater is treated. Uncollected and untreated wastewater can mix with floodwaters entering natural water bodies during climate change-induced floods, which aggravate water pollution issues and associated public health risks, that is, the spread of waterborne diseases.
- **Improving governance.** There is a lack of common data to facilitate coordinated multisector planning. Although economic instruments (including tariffs and fees) have been introduced, their implementation and impact have been limited. There is a shortfall in the water sector investments, with needs estimated at US$2.7 billion annually to achieve water and sanitation targets alone, against the current financing of roughly US$1.0 billion annually. However, the scope for private investment in the water sector is widening, including equitization (privatization) of water supply utilities and public-private partnerships (PPPs).

6. **The World Bank's flagship 'Water Governance Report' [10] highlights seven key recommendations to address the challenges facing the water sector:** (a) improve water resources management institutions and planning to address the division of tasks, improve regulations and incentives for water efficiency, and ring-fence revenues to reinvest in the water sector; (b) manage Viet Nam's water at the basin level through inclusive governance arrangements to address intersectoral issues for planning, water allocation, pollution control, and flooding and drought resilience; (c) increase the value

and will further increase flood levels.
[6] For example, in the Mekong delta region, land subsidence is 6 mm per year.
[7] UNISDR. 2014. *Prevention Web: Basic Country Statistics and Indicators*. https://www.preventionweb.net/countries.
[8] With nearly 3,500 rivers of more than 10 km in length in 16 major basins and with plentiful rainfall—almost 2,000 mm a year—the country is rich in water resources. Water features extensively in the country's history, art, and traditions. Rivers have determined the location of settlements and cities and power the country's industry. Their ample waters irrigate more than 4 million ha (Transforming Cultures eJournal – Vol.5 No 1 June 2010: Waterborne: Vietnamese Australians and river environments in Viet Nam and Sydney - Cadzow, Byrne, and Goodall). A vast network of 7,500 dams store and divert water to thousands of irrigation schemes, making Viet Nam one of the world's rice baskets. Hydropower accounts for about 42 percent of installed generation capacity of about 19.5 GW, with a further 193 projects (5.6 GW) under construction.
[9] World Bank. 2019. *Viet Nam: Towards a Safe, Clean and Resilient Water System*.
[10] World Bank. 2019. *Viet Nam: Towards a Safe, Clean and Resilient Water System*.

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Fig. 4. Viet Nam program document. Image credit: Screenshot from the World Bank (2023) document. © 2025 Mou Peijing

Ecological domination, on the other hand, reflects a worldview in which ecosystems, species, and landscapes are framed as passive, quantifiable resources to be managed, optimized, or extracted for human benefit (Plumwood, 2002). Rooted in critical theory, this

concept traces how Enlightenment rationality and capitalist development paradigms extend anthropocentric control into the ecological sphere. In contemporary discourse, ecologically dominating language often hides beneath narratives of development, management, and even conservation, framing human intervention like geoengineering as necessary and beneficial while perpetuating power over nonhuman life (Hulme, 2014). Identifying ecological dominating language is crucial for unveiling how even well-intentioned environmental projects can replicate dominative attitudes toward nature, ultimately silencing its agency and complexity.

As seen in the same Viet Nam document: “With nearly 3,500 rivers … the country is rich in water resources” (World Bank, 2023, p. 8). This sentence exemplifies a common framing of nature as a stockpile of exploitable resources awaiting human utilization. Ecologically dominating language quantifies nature through metrics, distorting living ecosystems into extractable assets while erasing their agency and masking domination as management.

The neutral category functions as a computational category within the language classification task. Sentences labeled as neutral are those that do not explicitly contain growth-oriented or ecologically dominating expressions. This category serves to balance the dataset and allow the model to distinguish between ideological and non-ideological language.

While pro-growth discourse emphasizes economic development, ecologically dominating language centers on extractivist logics. Though often intertwined, these two ideologies are distinct. Some texts reflect both while others reveal only one. Building on the critical definitions of pro-growth and ecologically dominating, this project repurposes an experimental computational model for ecological analysis. What *(Un)Natural Language* seeks to build is a relational and ecological ML powered by minimal, local energy, and built on systems that know when to yield with algorithms that breathe in rhythm with the more-than-human world. Instead of reproducing the extractive logic of mainstream computation, this work reimagines algorithms as instruments for excavating buried ecological narratives—and gestures toward the possibility of degrowth futures.

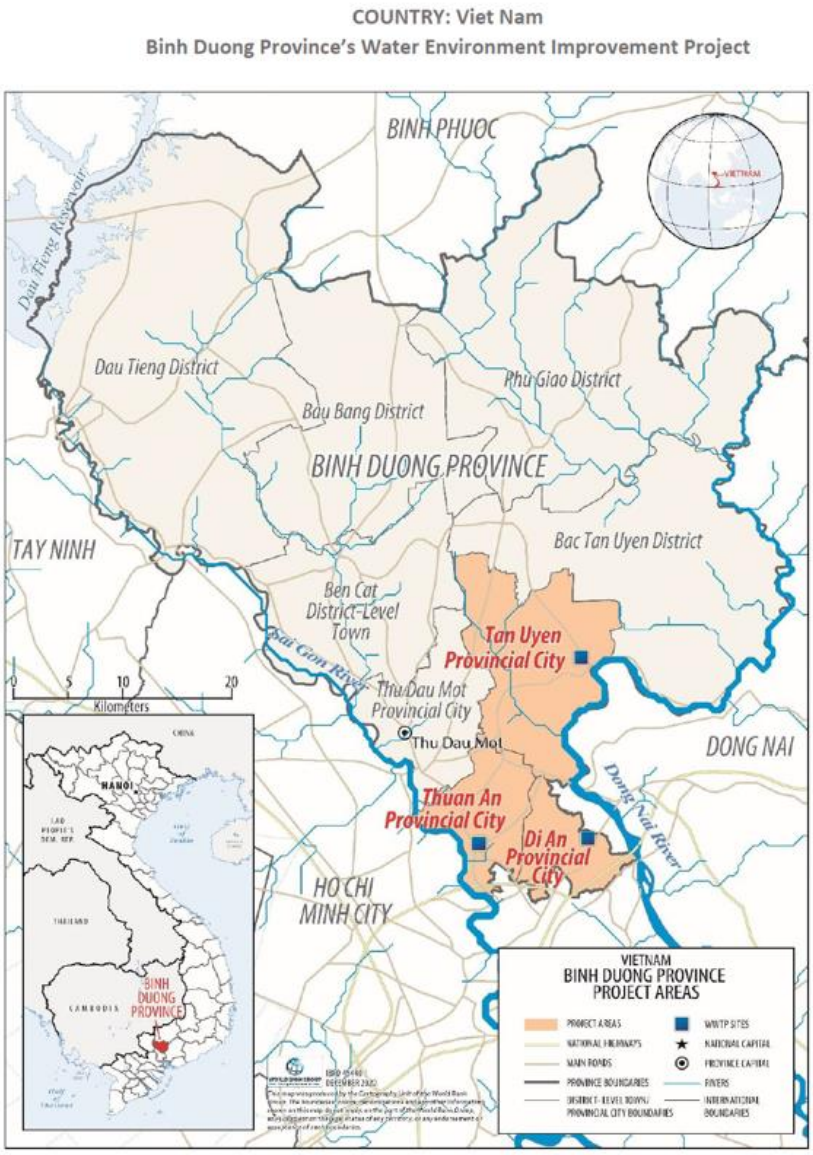

Fig. 5. Viet Nam Water Environment Project Map. Image credit: Screenshot from the World Bank (2023) document. © 2025 Mou Peijing

3.2 Operation & Design

Project link: https://driftinglab.github.io/unnatural-language/.

(Un)Natural Language functions as an interactive web-based archive. Reflecting its thematic focus on water-related infrastructure, the interface adopts a soft, medium-light blue palette, evoking the fluidity of river flow. Upon entering the platform, users can click either the title block or the rectangular "Document" tab (Fig. 1) to access the archive page (Fig. 6) where blue blocks drift slowly across the screen. Each block represents a specific infrastructure project and contains both the original project appraisal document and a

visualized discourse analysis. When hovering over a block, its motion pauses and the block is highlighted, inviting deeper engagement. Clicking on a block opens the documentation page (Fig. 7) where the corresponding original World Bank document appears on the left and the system-generated discourse visualization appears parallel on the right. Users can further navigate between two analytical lenses—"Pro-Growth" and "Ecologically Dominating"—through tabs located above the document. The sentences identified by the system are therefore directly aligned with their original locations in the document, allowing for intuitive side-by-side comparison. Highlighted sentences are color-coded according to the system's classification: darker blue signals explicit pro-growth or dominative logics while lighter hues indicate more ambiguous expressions.

Fig. 6. Archive page. Image credit: Artist. © 2025 Mou Peijing

Not only does the system analyze hydrology-related government documents, it also draws on a deeper metaphor: language as water. Animated by slow-drifting blocks and a fluid blue palette, the interface echoes the motion of rivers, inviting users to navigate bureaucratic texts not as static, rigid artifacts, but as living, shifting terrains of meaning. Just as water sustains life yet shapes landscapes, language shapes worldviews, politics, and ecological futures. By embedding this metaphor into the archive's visual and interaction design, the platform softens the intimidating formality of institutional discourse, making it more intuitive and emotionally engaging. This embodied visual experience lowers the cognitive

barrier to entry, making complex ideological critique approachable to the broader audience. While intellectually rigorous, traditional CDA often remains inaccessible to the public due to its academic presentation and abstract framing. Here, the artistic presentation opens a space where users can feel, reflect, and critique without requiring specialized training. In doing so, the project shows that art operates not as decoration, but as an affective and perceptual field—one that makes complex knowledge more accessible.

The visualization serves as more than an illustrative tool; it functions as a critical intervention that reframes seemingly neutral bureaucratic language into contested terrains of meaning. By spatially mapping system-identified sentences alongside the original texts, the visualization disrupts the illusion of textual coherence and neutrality, rendering visible the fractures, emphases, and absences that structure environmental discourse. In this way, *(Un)Natural Language* not only reveals patterns otherwise imperceptible through traditional reading, but also foregrounds the politics of interpretation itself by inviting users to inhabit an active, interrogative stance toward documents that typically operate by naturalizing power.

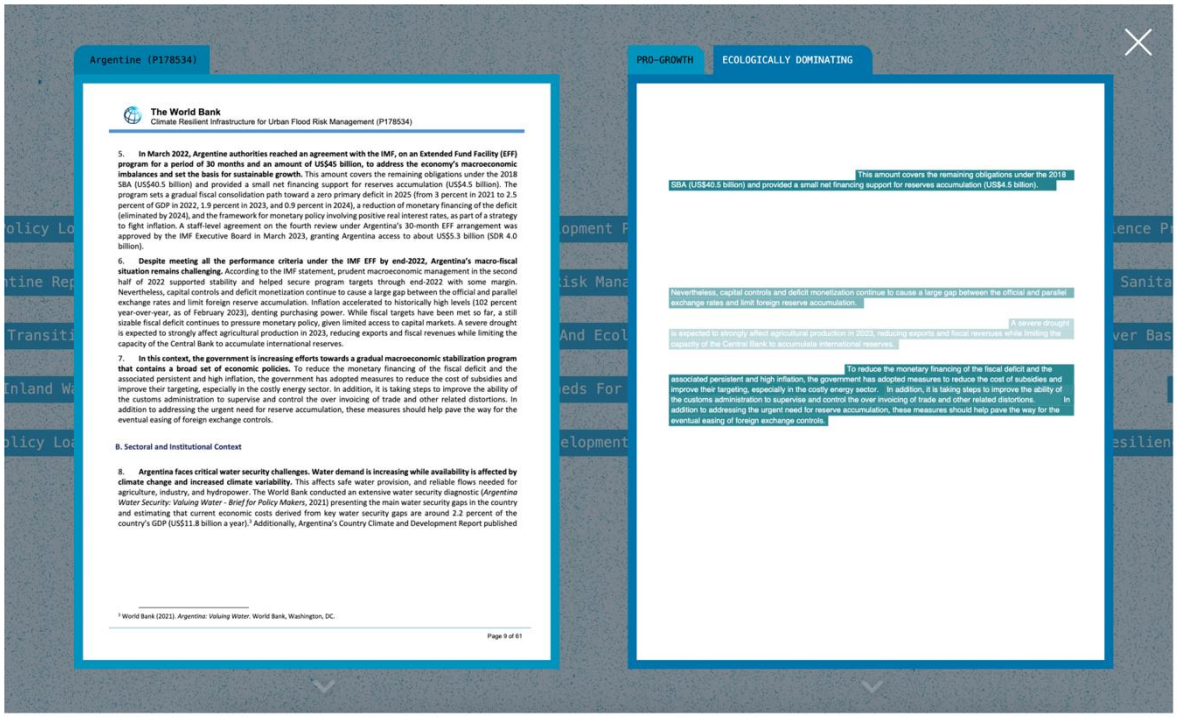

Fig. 7. Original document collected from the World Bank (left); New generated document processed and visualized through the system under the ecologically dominating category. Image credit: Artist. © 2025 Mou Peijing

An essential component of this project is its API, which extends the platform's functionality beyond the interface itself. *(Un)Natural Language* is conceived as a fully open-source, decentralized art software system, inviting artists, researchers, and technologists to engage with the work critically and collaboratively. In contrast to the closed, proprietary practices of industrial AI where models and datasets are often hidden behind corporate walls, this project foregrounds technical legibility and ethical openness. The API page (Fig. 8) allows users to input custom sentences and test the model online. All code and model infrastructure are available, supporting both transparency and potential future development. The "About" page provides additional context, including a brief introduction and a critical glossary.

GitHub link: https://github.com/DriftingLab/unnatural-language.git.

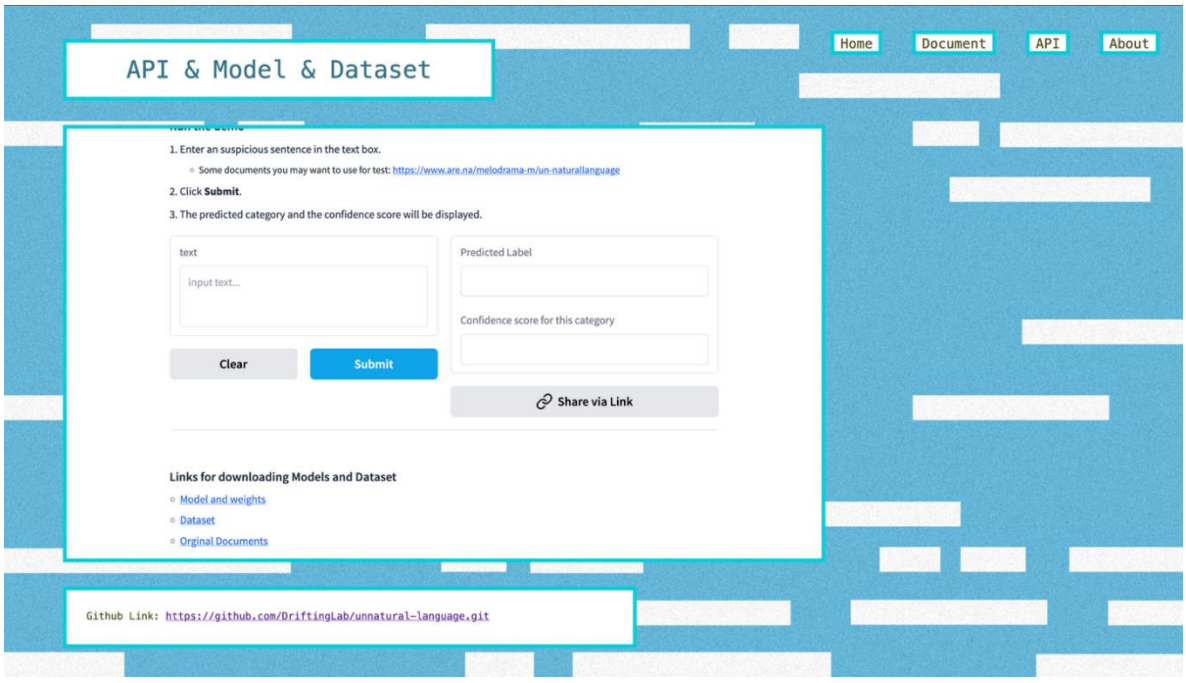

Fig. 8. Online API page. Image credit: Artist. © 2025 Mou Peijing

4. Technical Description

This system (Fig. 9) is built on a fine-tuned BERT (Bidirectional encoder representations from transformers) model trained with a custom dataset. It classifies sentences such as pro-growth, ecologically dominating, and neutral. The model focuses on identifying economics

and management related phrases through hidden ideologies based on actions (e.g., development, extraction, expansion), perspectives (e.g., capitalism, domination, greenwashing), and priorities (e.g., economic growth). The system includes four primary phases: data collection and processing, labeling, training and interpretive output generation.

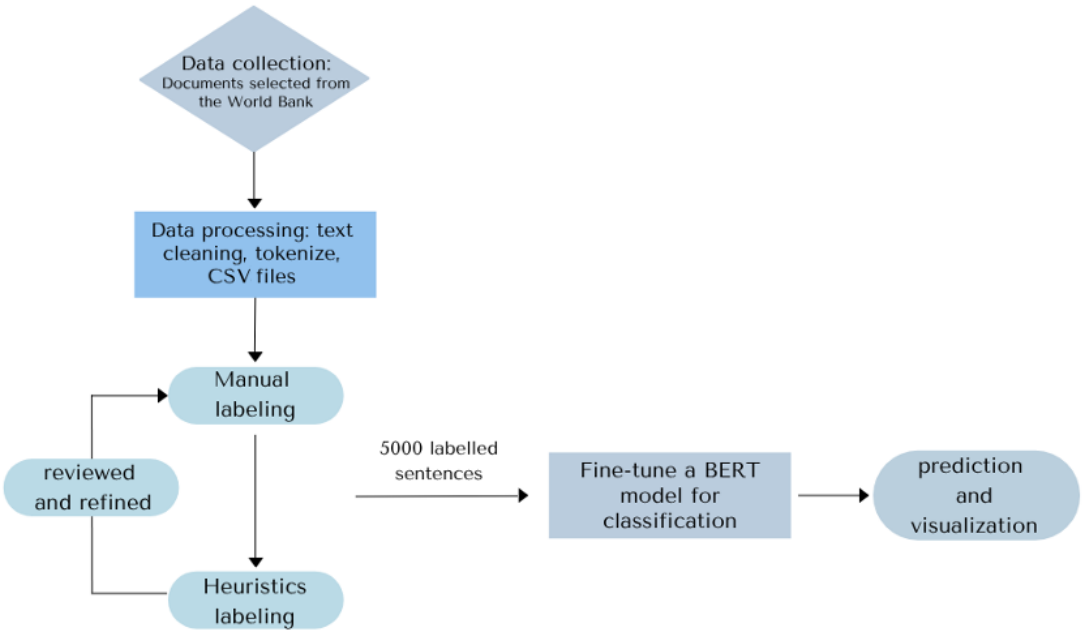

Fig. 9. System workflow. Image credit: Artist. © 2025 Mou Peijing

Public documents from the World Bank were collected, cleaned, and segmented into sentences using the Natural Language Toolkit tokenizer. Labeling was conducted using Refinery, an open-source UI tool that supports both manual annotation and heuristic labeling. Approximately 50% of the data was labeled manually, with the remaining portion completed through rule-based heuristics. The labeled dataset was exported to fine-tune a customized BERT model, modified with additional dropout and dense layers for multi-label text classification. Once trained, the model assigns categorical labels to new input sentences and returns a score for each labeled sentence based on its computed latent embeddings indicating the degree to which the sentence aligns with the assigned category. Open-sourced and decentralized, this system offers an experimental artistic method to examine ideological assumptions embedded in ecological discourse, inviting others to extend the work with larger datasets.

	seq	pro-growth
1	After two decades of uninterrupted expansion the Morocco economy is facing several challenges.	0.41752682261997
2	Economic structural reforms launched in the late 1990s led to increase the country's real gross domestic product (GDP) by nearly 120 percent between 2000 and 2019, expand per capita income by 72 percent, a	0.9749168819851350
3	However, real GDP fell by 6.3 percent in 2020 – according to recent estimates- due to the COVID-19 pandemic, the largest contraction on record.	0.9224601321750220
4	After the gradual lifting of restrictions, economic activity began to pick up in late 2020, and Morocco's real GDP grew by 7.9 percent in 2021.	0.9091810650295680
5	GDP growth dropped to just 1.2 percent in 2022,1 resulting from overlapping shocks, including the sharp contraction in agricultural GDP due to the drought, the commodity price shocks triggered by Russia's inv	0.8209020296732580
6	Economic growth is expected to accelerate to 2.5 percent in 2023.	0.8619715372721350
7	The economic growth model that served Morocco well in recent decades shows signs of slowing down and needing to adapt to changing realities.	0.9197318818834090
8	More than half of GDP growth in recent decades was driven by fixed capital accumulation, which surpassed 30 percent of GDP since the early 2000s with two-thirds originating from public sources.	0.8874909612867570
9	The economy has not generated enough jobs to absorb a growing working-age population and overall unemployment remains high at around 12.8 percent in 2022, with urban youth unemployment reaching 33.4	0.7675252490573460
10	The female participation rate in the labor force in Morocco is low and declining, with important implications for women's autonomy and the country's economic potential.	0.7885157267252600
11	Morocco's New Development Model (NDM) presents a new vision for the country's development.6 The structural reforms launched two decades ago gave way to a sustained period of economic growth and pov	0.7619987593756780
12	But, even before the abrupt recession triggered by the pandemic, the model exhibited signs of exhaustion, prompting the launch of an inclusive dialogue on how to reinvigorate Morocco's path toward sustained	0.8825927310519750
13	This dialogue resulted in 2021 in the NDM, which sets ambitious development targets with a 2035 horizon, including doubling per capita GDP levels.	0.8562327490912540
14	"The New Development Model, releasing energies and regaining trust to accelerate the march of progress and prosperity for all".	0.11474370956420900
15	The World Bank Morocco Water Security and Resilience Program (P179192) This goal would require (a) sustaining an average annual growth rate of almost 7 percent for the next 12 years; (b) prioritizing actions	0.8481667306688100
16	According to the Country Climate and Development Report for Morocco (CCDR),12 the greatest potential for putting Morocco on a climate-resilient and low-carbon pathway lies in (a) tackling water scarcity and	0.37802484300401500
17	The CCDR highlights the need for improved inter-institutional coordination13 and mainstreaming climate actions into economic, fiscal, and financial policies.	0.7881158722771540
18	These changes in supply and demand could result in a deficit of between 4 to 7 BCM per year by 2050.19 Such constraints could significantly affect the Moroccan economy,20 with water scarcity exacerbating c	0.674717002444797
19	Expected industrial demand growth is similar (from 241 to 370 MCM per year), and water from tourism is expected to more than triple by 2050 (from 33 to 106 MCM per year).	0.9318534003363720
20	Based on an estimated population growth of 1.5 percent per year and economic growth of 4 percent per year.	0.7332870695326060
21	The governance of the water sector is evolving in response to the changing nature of water resources and the new socio-economic vision.	0.7912938329908580
22	In keeping with the Constitutional goal of increasing women's political and economic participation, the Water Law 36-15 (2016) emphasizes a gender approach in the sector by promoting equitable access to wa	0.5274260309007430
23	Finally, the PNAEPI recognizes female empowerment, workplace gender equity, and women's participation as critical aspects of Morocco's prosperity.	0.086136347717709
24	These efforts notwithstanding, the persistent challenges in the sector require a sustained effort to achieve greater gender equality and ensure women empowerment.	0.6204618877834740

Fig. 10. Returned labeled result with confidence scores from the system. Image credit: Artist. © 2025 Mou Peijing

Using the pro-growth category to explain how this system works, Fig. 10 shows every pro-growth sentence in this document returned by the system. The degree of pro-growth alignment for each sentence is represented by a value between 0 and 1 in the right column. The first captured sentence is scored at 0.4118 (rounded) with a pro-growth label. The phrase "two decades of uninterrupted expansion" naturalizes economic growth as a positive trajectory, reinforcing a growth discourse without questioning its assumptions. This example demonstrates how the system identifies subtle growth narratives, quantified by a 0.4118 confidence score. Line 3, "Economic structural reforms launched in the late 1990s led to increase… and almost eradicate extreme poverty," returns a value of 0.9749, showing an obvious growth-orientated tone that highlights economic structure, income and GDP growth. Visualizing as the following figure:

Fig. 11. Visualization for the first captured sentence and line 3. Image credit: Artist. © 2025 Mou Peijing

Linguistically, line 15—"The New Development Model, releasing energies and regaining trust to accelerate the march of progress and prosperity for all"—uses positive word choices to encourage and convince the public that development is a linear and desirable process,

foreclosing critical reflection on the socio-ecological consequences of accelerated expansion. This sentence sounds optimistic and encouraging but is deeply entangled with a growth mindset which can be hard to detect, scored at a relatively low value of 0.1147, visualizing as light blue in the following figure:

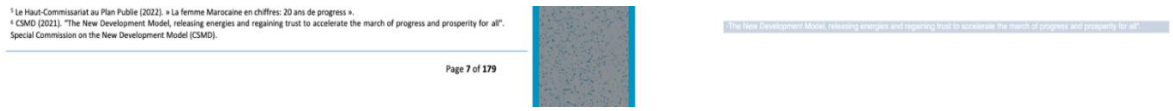

Fig. 12. Visualization for line 15. Image credit: Artist. © 2025 Mou Peijing

This visualization system turns the returns from the model into new generated documents. It gives the audience clear highlights to read and reflect on the language used in these sentences, with different color shades indicating different levels of visibility and severity of growth or ecological domination. The following image displays what the entire language pattern looks like.

Fig. 13. Overview for new generated document. Image credit: Artist. © 2025 Mou Peijing

5. Contributions

This project offers a new contribution at the intersection of climate activism, net art, and alternative AI research. Within climate activism and public discourse, this project directly addresses the materiality of language—how words shape worlds. Moving beyond conventional critical discourse analysis (CDA) limited to academic audiences, it creates a more legible and intuitive interface for public reflection on ecological rhetoric.

Compared to traditional CDA, this system not only increases the capacity for close and distinct reading, but also dramatically increases speed, allowing the analysis of hundreds of institutional documents feasible without sacrificing critical sensitivity. By automating and visualizing the detection of pro-growth and ecologically dominating narratives, *(Un)Natural Language* opens new pathways for public ecological critique. These improvements are not for efficiency's sake alone, but to equip climate activism with a more accessible, scalable, and visually engaging mode of intervention. It enables a broad range of users—activists, educators, scholars, artists, and communities—to confront the ideological frameworks that normalize environmental harm. In doing so, the project functions not just as an analytical tool but as a decentralized site of climate activism.

Situated within the development of net art, this work reclaims ML as an artistic medium — not a tool for solving problems, but a conceptual space for rethinking the meaning of machine interpretation. It rejects the pursuit of technical perfection in favor of deeper political and ecological reflection. By questioning the prevailing logic of ML, centered on efficiency and accuracy, it embraces indeterminacy and critical reflection, offering instead a decentralized engagement with technology. Unlike traditional computer science endeavors that pursue maximum model accuracy, this system redefines effectiveness and success within an ecolinguistic frame. It treats returned values as the weight of ideological language rather than accurate classification prediction. The labeling process is intentionally subjective—an artistic act rather than a scientific protocol—guided by an ethical commitment to ecological fairness and degrowth over algorithmic objectivity. This shift challenges the standard of prediction and classification by inviting ambiguity and degrowth into the core of ML practice.

In the broader field of NLP and linguistic technology, *(Un)Natural Language* offers an alternative use of AI. Dominant ML applications typically accelerate economic growth and reinforce state or corporate control, however, this project facilitates ecological language analysis aimed explicitly against growth hegemony. By foregrounding accessibility and relatedness—central aspects of the post-growth innovation framework outlined by Pansera and Fressoli (2021)—this project questions mainstream technological paradigms and introduces an artistic, ecological, and decentralized approach.

Accessibility is fundamental to the design philosophy of this project. The entire system, including the dataset, code, and model is fully downloadable and open-sourced, actively democratizing computational tools that have historically been confined to technical experts. By offering an intentionally intuitive and visually engaging interface, the project significantly lowers the barrier to entry enabling broad participation. Consequently, not only technical specialists but also activists, educators, artists, and diverse community members are empowered to meaningfully engage with critical ecological discourse. Relatedness is embedded deeply within the project's conceptual and aesthetic foundations. Rather than viewing technology merely as a means for efficiency for growth, it emphasizes emotional and sensory connections to ecological realities. The metaphor of “language as water” directs the design, reinforcing the relationality between humans and ecosystems. This visual encourages users to perceive linguistic structures not as abstract entities but as fluid components interconnected with ecological conditions and human values, fostering an embodied awareness of ecological issues.

Crucially, *(Un)Natural Language* extends the post-growth innovation framework through its identity as an artwork developed by an individual artist. This project highlights the potential of individual creativity and subjective interpretation within technological innovation. Artistic practice is uniquely positioned to effectively raise ecological consciousness and provoke widespread social reflection and engagement. Rather than relying solely on policy or technical interventions, artistic projects such as this create critical spaces capable of inspiring broader audiences through affective and aesthetic experiences. It embodies a core principle of post-growth innovation through shifting agency from elites to diverse publics while emphasizing artistic engagement as an essential medium for reshaping public

awareness toward ecological care and social justice.

6. Conclusion

(Un)Natural Language is a critical artistic project that merges ecolinguistics and machine learning to analyze how institutional documents reproduce pro-growth and ecologically dominating narratives. Through a combination of data processing, automated sentence classification, and interactive visualization, it transforms bureaucratic language into ecological critique. It challenges the dominant technocratic narratives of pro-growth and offers an accessible and critical method for revealing ideologies within public discourse. As both a research tool and a public-facing artwork, it reclaims computation as a space for reflection rather than control, inviting users to rethink the language shaping our ecological futures.

Conflict of interest

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The author

Melody Mou Peijing (she/her) is a media artist and researcher working across critical ecology, computation, and experimental narrative. Her research addresses threatened ecologies in the context of social conflicts, indigenous knowledges, and the ways language reproduces ideological assumptions. Her practice draws from critical ecology and computational humanities, often entangling natural processes with digital systems to question anthropocentric narratives. Her goals revolve around developing innovative applications of technology and demonstrating how digital media can nurture our coexistence with non-human agencies.

Previously, she worked as a researcher and creative technologist at the Centre for Applied Computing and Interactive Media at CityU's School of Creative Media and the Hong Kong Arts Development Council, where she explored the creative potential of machine learning in reconfiguring moving images through algorithmic experimentation. Her works have been exhibited internationally at SIGGRAPH Asia, NeurIPS Art Gallery, FILE Festival, The New River, the New Media Writing Prize, and The Wrong Biennale, among others. She received her BA in Creative Media from City University of Hong Kong and is currently pursuing an MFA in Design | Media Arts at UCLA, supported by a University Fellowship, where she also serves as a Teaching Assistant.