

A "Digital Lorax": AI for Environmental Justice, Permitting, and Siting

Executive Summary

Less privileged communities across the world are increasingly under threat by the rapid changes of AI – not just due to its ramifications for the job market and work, but from the physical data centers and power it relies on. AI, particularly Large Language Models (LLMs) enriched via Retrieval Augmented Generation (RAG) with documents from successful community groups, can help minimize damage by providing underprivileged communities with easy to use solutions to encourage good development. Information and technical assistance can help communities craft meaningful Community Benefit Agreements (CBAs) like the ones associated with the Block Island Wind Farm, and avoid the fate of failed CBA projects like many Reducing Emissions from Deforestation and Forest Degradation (REDD+) projects. LLMs can also help provide advice and resources for battles against bad infrastructure, like some AI data center expansions in Northern Virginia, and reduce larger nonprofits' legal exposure over local activism, such as the bankruptcy of Greenpeace over the Dakota Access Pipeline (DAPL) protests. Furthermore, it can help elevate voices, empower activism, and draw attention to less well-publicized issues, such as the numerous human rights violations associated with cobalt mining in the Congo.

While there are risks with the proposed LLM, like AI slop proliferation, hallucinations, competing causes, big tech control, and inability to deal with complex bureaucratic systems, it is the only way to generate such a large boost in local organizations' resources without an unlikely groundswell of support. Advice-focused, human-centered, and open-source AI development can mitigate these risks, and ensure development of a useful LLM tool that provides community groups with an outsized benefit. Especially in an era of accelerating change due to the proliferation of AI, it is important to ensure communities across the world have a say in their future – and MIT can advance this goal by planting a kernel that can grow into a tree of digital resources.

1. The "Digital Lorax"

Less privileged communities across the world are increasingly under threat by the rapid changes of AI – not just due to its ramifications for the job market and work, but from the physical data centers and power it relies on. For every kilogram of computational equipment in a data center, 400 kilograms of raw materials, including highly toxic rare earth elements [1]. Furthermore, each data center can use up to five million gallons of water per day, and their accompanying power generation and other infrastructure emits large quantities of climate change-driving carbon dioxide and localized air pollutants like particulate matter and nitrogen oxides [2]. AI data centers use up to 8 times as much energy as other computational tasks, and consume more power than the entire nation of Saudi Arabia [3]. These burdens fall disproportionately on communities of color, low income communities, and those already facing a high burden of air pollution [4]. These communities are the most disempowered and disadvantaged, making them the least able to resist development, least able to partner effectively with companies for beneficial development, and thus the easiest communities to continue to build into.

Yet AI can also serve as the solution, by providing these underprivileged communities with easy to use solutions that could help bridge that resource gap. Particularly, Large Language Models (LLMs) enriched via Retrieval Augmented Generation (RAG) with documents from successful nonprofits, community groups, and organizations that have successfully developed community-led infrastructure. These LLMs would help community organizations and activism-minded individuals parse technical documents, navigate bureaucratic systems, and streamline searches for partner organizations, individuals, or similar cases. Such a solution would be (relatively) easy to develop, easy to deploy, easy to use, and can be rapidly spread to underserved communities across the world. Such systems are flexible and can handle various cultural, legal, and linguistic contexts. Despite hallucinations, this application is the only way to overcome large gaps in knowledge, resources, and time without dramatic systematic changes, using the same advantages of LLMs that led to their rapid rise and

the accompanying proliferation of data centers. These environmental and community impacts are already occurring, though AI is still affecting and shifting broader sociopolitical and economic systems. But right now, it can be used to even the playing field, and ensure all voices have a say in how those systems develop.

2. Case Studies: The Good, the Bad, and the Ugly

2a. The Good: Collaborating on the Green Economy

With resources, it is possible to have good, meaningful development of infrastructure, including data centers, that benefit both corporations and communities. Steps like community benefits agreements (CBAs) are crucial to providing this mutual benefit, with terms including local employment, resources, new infrastructure for the community's needs, and even dedicated funds for local governments and organizations [5]. For example, the Block Island Wind Farm, which is the first commercial offshore wind farm in the US, was built accompanying a CBA allowing for upgrades of overhead utility lines, water infrastructure improvements, and switching the local town to clean energy along with the infrastructure upgrades associated with the farm [5]. The project was able to simultaneously benefit the company and the community in which it was sited.



Figure 1: The Block Island Wind Farm under construction [5]

Yet these community co-benefits are impossible without the community having some resources in the first place. In the Block Island Wind Farm case, the local town of New Shoreham needed resources to hire consultants to decipher the project plans and clearly communicate to residents, as well as the prerequisite knowledge to understand CBAs in the first place [5]. Furthermore, those resources allowed them to have some leverage over the project, which can help convince companies to negotiate. However, another large class of projects designed to help both communities and corporations, known as Reducing Emissions from Deforestation and Forest Degradation (REDD+) projects, are rife with failures. On paper, this standard helps indigenous communities globally benefit financially from protecting their forests via payoffs and other development associated with sales of carbon credits managed by companies [6,7]. In practice, however, REDD+ projects have forced communities with no leverage off of their land, led to community benefits funds being embezzled, and major greenwashing activities [6,7]. Underprivileged communities simply are unable to muster the resources to resist these actions, and thus face the detriments.

AI can help give these communities the same understanding and some of the power of the town of New Shoreham, ensuring that successful, enforceable CBAs that genuinely benefit communities are enacted. LLM systems are particularly well suited to breaking down complex legal documents and technical plans into simple, high-level overviews understandable by everyday people. If done properly, these agreements have the potential to transform the infrastructure, careers, and livelihoods of those from these under-resourced communities, and ensure the benefits of development are shared equitably.

2b. The Bad: Resisting Environmental Damage

On the flip side, communities with resources also have the ability to stop bad-faith detrimental projects. Activist groups have already led to over \$18 billion in data center projects being blocked in the US, with over 142 groups working on this issue [8].

Pushback has been particularly strong in the data center development rich corridor of Northern Virginia, which has a large number of relatively well-resourced communities that were able to form 42 separate activist groups and an overarching coalition to resist further negative impact development [9].

Yet communities without resources have been unable to stop other developments. Despite the involvement and support of the international organization Greenpeace, the Standing Rock Sioux Tribe was unable to stop the construction of the Dakota Access Pipeline (DAPL) [10]. That pipeline was initially planned to go through a region just north of Bismarck, the capital of North Dakota, but was rerouted when better connected and resourced residents of Bismarck voiced concerns over potential contamination of their water supply [10]. Additional resources, in the form of AI-assisted knowledge, could have boosted the tribe's connections, reach, and ability to mount independent legal challenges. Furthermore, separation of local activism efforts from larger international nonprofits can help shield those organizations and their resources from antidemocratic legal efforts like Strategic Lawsuits Against Public Participation (SLAPP). In the DAPL case, a SLAPP lawsuit by the pipeline's owner, Energy Transfer, risks bankrupting the US arm of Greenpeace with \$667 million in fines, and could potentially threaten the global organization as well [11]. Separation could help prevent local defeats for one community spiralling into larger defeats affecting many communities.

Bad infrastructure has a long history of these injustices, with projects such as the transformative 1956 National Interstate Highway Act leading to the displacement of over a million people and the destruction of an entire community in Florida [12]. Without change, the data center boom of today risks leading to the same disastrous consequences. Flexible tools like targeted LLMs can ensure no communities get left behind, and empower and enable all communities to resist bad projects and fight back against their displacement.

3c. The Ugly: Raising Awareness for the Invisible

AI can also help illuminate ongoing injustices associated with bad development, and draw better resourced organizations to fight larger, systemic injustices that would be impossible otherwise. For example, exploitation of cobalt resources in the Democratic Republic of the Congo (DRC) is leading to a series of mass horrors. Cobalt is a critical mineral for almost all battery-powered technology, including large lithium ion batteries that are increasingly present for backup power at data centers, and the DRC produces almost 75% of it globally [13]. A civil war has been raging in the core cobalt producing regions of the DRC for almost the last 2 decades, with over a million dead, 7 million displaced, widespread sexual violence, ethnic violence, summary executions of hundreds at a time, and more [14,15]. Mining efforts themselves also lead to mass evictions, damage water sources, employ children as modern-day slaves, and present dangerous toxins from the metal itself [16]. Despite a huge laundry list of abuses, the situation in the DRC often receives less global attention, aid, and other efforts that could promote major systematic change than other global conflicts in regions like the Ukraine, Gaza, and Taiwan [17]. While AI-powered misinformation and disinformation is rampant on social media and other platforms, intelligent AI-powered activism can help create more effective materials that could encourage global leaders and other organizations to pay more attention to these often-ignored communities that can suffer the most.



Figure 2: Soldiers in a cobalt-rich portion of the DRC

LLMs can also help people on the ground reach out, make these connections, and begin advocacy themselves. Despite one of the lowest rates of internet penetration in the world, almost a third of DRC residents have internet access, and could benefit from solutions that allow them to better understand broader social, political, and economic ecosystems and connect to external resources and support. In turn, this could spur grassroots activism campaigns that, when combined with global support, could lead to real transformative potential. The DRC is far from the only place where this type of activism could start to take root. Another prime example would be added resources for local residents to stomp out human trafficking and modern-day slavery associated with scam centers in Myanmar, another less publicized issue that causes great suffering [18]. Individual facilities have been targeted and shut down by local activist campaigns, and the victims liberated [18]. With careful effort and planning, AI does not just have to be thneed-like multipurpose tool for the privileged to optimize their businesses and improve their lives while harming the environment, but it can also a way for the less fortunate to be their own champions and fight back – a “digital Lorax”.

3. Risks: Drowning Out Voices and Too Many Layers

3a. Drowning Out Voices: Speaking Over People

However, the same power of this additional, AI-powered voice is one of its major risks, which is drowning out the voices of the people it is supposed to help. Widespread use of such a tool could lead to AI activism “slop”, which would discount all AI-enabled/assisted activism work, and even potentially all activism or community-led work in general. Rather than elevating the voices of the less fortunate, it could simply drown out all voices, letting projects go through unopposed. Furthermore, hallucinations, inaccuracies, and biases in such systems could also obfuscate people’s voices, making their points of view hard to hear, or twisting their perspectives. A particularly pernicious version of this risk could involve big tech companies intentionally biasing AI models to sabotage activism work against their projects, such as data center

expansions. Such a move could allow them to subtly handicap their opponents while hiding the conflict of interest.

Risks remain even with just appropriate, unbiased use of effective tools, namely in an overwhelming number of issues. A simultaneous increase in efforts related to the many injustices and other societal challenges worldwide may lead to emotional “burnout” of well-meaning individuals who would otherwise work on a cause, resources being stretched too thin, and the development of an emotional apathy towards suffering. If everyone is heard loud and clear, perhaps nobody is heard at all.

3b. Too Many Layers: Complex Computational Systems May Not Simplify Complex Bureaucratic Ones

Even with additional data, LLMs may be unable to handle the mixture of complex technical and bureaucratic issues that go along with the development of projects and other legal avenues for recourse. Permitting work, approvals, and justice and oversight groups may be spread across multiple departments and jurisdictions, making it challenging to disentangle and explain simply to non-experts.

The possibility of unknown hallucinations due to LLMs’ black box nature only exacerbates these issues for groups without the knowledge or ability to externally verify results. Ironically, the same benefits of a large number of interconnected layers that produce LLMs’ impressive performance but lead to unexplainable results are the same type of dense interconnections that can make bureaucratic systems at times highly effective but complicated to understand and navigate. Additional rules governmental organizations might adopt to handle AI are likely to make processes even more complex and challenging for communities to understand and deal with. Even if LLMs are able to handle these complex, multidisciplinary tasks, they may still prove insufficient or ineffective against much better-resourced companies who are able to hire human experts and use similar LLMs to fight back. In an LLM strength arms race between communities and companies, the companies are likely to win.

4. Not Enough People Care A Whole Awful Lot: Why A Digital Advocate Is Necessary

Despite these meaningful limitations, an AI tool to assist community groups and would-be activists with knowledge, planning assistance, and resources is necessary as there is no other way to vastly increase the resources or staffing power of such groups short of a drastic change in social engagement. While a traditional infusion of time, money, and the effort of traditional experts would be preferable, only an AI tool is able to have such a large potential asymmetric resistance benefit where a small input of expertise and resources has such a broad impact.

The drawbacks of the LLM system can be reduced by focusing on advice-focused, human-centric, and open-sourced tools. Advice-focused tools, which seek to advise humans instead of duplicating their end products, reduces the risk of proliferation of AI slop, as AI systems are isolated from the larger world. Processes remain fundamentally the same, which also limits the growth of extra rules. Human-centric design, where focus testing and user feedback is used to fine-tune results into a readily digestible form, can help ensure that LLM outputs are actually used and valued by humans. Another potential human-centric design feature could be incorporating siloed tool-calling for economic analysis, carbon footprint, and other calculation-based tasks, minimizing the likelihood of AI fabrication or mathematical inaccuracies. Open-source distribution across multiple channels can promote access in countries with restrictive regimes, and prevents big tech companies or governments from controlling and being able to manipulate the LLM. In an age of accelerating risks from the physical infrastructure of AI, only by utilizing AI's rapid deployability, flexible usage, and power can community input be preserved.

5. All It Takes Is Planting A Kernel

An LLM tool capable of helping community groups understand and navigate complex technical and bureaucratic systems could help reduce the spread of injustices

associated with bad project development across the planet, and instead promote community-led design and beneficial projects. While risks of AI slop, big tech control, and unusable tools exist, they can be mitigated via advice-focused, human-centric, and open-source tools. The rapid pace of AI development itself makes the creation of such a tool even more important to handle unprecedented threats and help restrain the excesses of those chasing the most extreme versions of the future.

Many communities across the world are still living with systemic injustices caused by the industrial revolution, not to mention the broader issue of climate change, and powerful tools are necessary to ensure history does not repeat itself with the budding AI revolution. As it stands, not enough people with sufficient power care enough to ensure resistance is possible, and projects and negative development steamroll the vulnerable. But not everyone needs to care – just us. A well-developed tool is all that is needed to arm vulnerable people globally with the asymmetric tools they need not just to fight back, but to genuinely cooperate as partners and benefit from technology and development. This tool is not just an abstract idea – the technology for effective RAG-enhanced LLMs exists and is widely used today. MIT could partner with nonprofits and community groups to build such a system. We can be the ones to plant this digital kernel, this digital seed, and start making real change.

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