Integrating Differences: Philosopical Aspects in Sociology and Vice Versa

Edited by Georg Peter and Reuss-Markus Krausse

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Navigating the Double Divide: Generative AI and the Dynamics of Inequality in Latin America

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Abstract

The rapid advancement of generative artificial intelligence (AI) presents both opportunities and challenges for social equality, particularly in regions like Latin America, where significant socioeconomic disparities persist. This paper empirically investigates two competing hypotheses about the impact of generative AI on inequality in Latin America: (1) that AI may exacerbate existing inequalities by disproportionately benefiting more affluent regions with pre-existing technological access and skills; and (2) that AI has the potential to reduce inequality by democratizing access to educational resources, creative tools, and economic opportunities. Leveraging Google Trends data on AI-related search terms from January 2022 to January 2024, we employ a novel hierarchy of search terms as a proxy for the depth of AI engagement across different regions in Latin America and developed countries. We find evidence of a "double divide" in AI engagement – significant disparities both within Latin American countries, with AI interest concentrated in urban, affluent areas, and between Latin America and developed nations, with the region lagging in searches for specialized AI tools. Our analysis reveals a complex landscape of AI adoption, with the rapid spread of general AI awareness co-existing with persistent gaps in engagement with advanced applications. We argue that this double divide poses significant challenges for Latin America to fully harness the potential of AI for equitable development. The paper concludes by highlighting the need for nuanced, multi-pronged policy approaches that simultaneously capitalize on growing general AI interest while fostering deeper, specialized engagement. Our findings contribute to the growing literature on the social implications of AI and inform policy discussions on steering technological change towards inclusive growth in Latin America and beyond.

1. Introduction: Generative AI and inequality in Latin America

The rapid advancement and proliferation of generative artificial intelligence (AI) technologies have sparked a global discourse on their potential societal impacts (Acemoglu, 2021). In the context of Latin America, a region characterized by persistent socioeconomic disparities (Gasparini et al., 2021), the emergence of generative AI presents both promises and challenges for social equality. Here we examine two competing perspectives on the potential effects of generative AI on inequality in Latin American societies.

The first perspective posits that generative AI may exacerbate existing inequalities by disproportionately benefiting those with pre-existing technologi-

cal access and skills. This view aligns with the concept of the "Matthew Effect," originally proposed by sociologist Robert K. Merton (1968) to describe cumulative advantage in scientific recognition[1]. The Matthew Effect, which suggests that initial advantages tend to compound over time, has been extended to various domains, including technology adoption and digital inequality (DiMaggio & Garip, 2012; van Dijk, 2005, 2020). In the context of generative AI, this effect suggests that individuals or regions with existing technological access and skills may disproportionately benefit from these new tools, potentially widening the gap between technology "haves" and "have-nots" (Merton, 1988; Perc, 2014).

This effect could be particularly pronounced in Latin America, where significant digital divides already persist (Galperin, 2017). The introduction of advanced AI tools in this context could further marginalize already disadvantaged groups. Those with better internet access, higher digital literacy, and the financial means to access AI technologies may gain substantial advantages in education, employment, and creative endeavors (Korinek & Stiglitz, 2021). Moreover, proficiency in English serves as an additional advantage, as many cutting-edge AI tools and resources are primarily developed and documented in English. This language barrier could further widen the gap between those who can fully engage with global AI developments and those who cannot. As a result, early adopters of AI technologies in the region, particularly those with strong English language skills, might experience compounding benefits, leading to a scenario where initial disparities in access, skills, and language proficiency translate into widening gaps in economic opportunities and social mobility.

Conversely, the second perspective suggests that generative AI has the potential to reduce inequality by democratizing access to educational resources, creative tools, and economic opportunities. Proponents of this view argue that AI could act as a "great equalizer" by providing high-quality, personalized learning experiences at scale (Reich & Ito, 2017). In the Latin American context, where access to quality education and creative tools has been limited

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1   "For unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath." This quote is derived from the Gospel of Matthew 25:29 (King James Version). Merton first used this quote in his 1968 paper "The Matthew Effect in Science" published in Science, 159(3810), 56–63. He applied this concept to explain how eminent scientists often get more credit than comparatively unknown researchers, even if their work is similar. In the context of your research on AI and inequality in Latin America, this quote could be used to illustrate how initial advantages in AI access and knowledge might lead to further advantages, potentially exacerbating existing inequalities.

for many, generative AI could offer new pathways for skill development and economic participation (Cobo et al., 2020). Technologies like AI-powered language models could break down language barriers, while AI-assisted design tools could empower a new generation of creators regardless of their formal training (Hidalgo et al., 2021). Furthermore, AI has the potential to significantly reduce costs for tasks that were previously expensive or required scarce expertise. This cost reduction could improve competitiveness for many small businesses that lack resources, allowing them to access capabilities and services that were once the domain of larger, well-funded companies. As a result, AI could potentially level the playing field in various industries, enabling smaller players to compete more effectively and fostering a more diverse and dynamic economic landscape. Moreover, AI technologies could finally enable Latin American production to have a chance of becoming truly global. For instance, AI-powered translation and localization tools could facilitate the creation of high-quality English versions of Latin American products, scholarly works, and cultural content. This could significantly broaden the reach and impact of Latin American intellectual and creative output, potentially leading to greater recognition, collaboration opportunities, and economic benefits on the global stage.

The tension between these two perspectives reflects broader debates about the role of technology in shaping social inequality (Eubanks, 2018). While technological advancements have historically been associated with increased productivity and economic growth, their benefits have not always been evenly distributed (Goldin & Katz, 2010). In Latin America, where structural inequalities are deeply entrenched, the impact of generative AI may be particularly consequential (Bogliacino & Codagnone, 2019). This paper aims to critically examine these competing claims within the Latin American context. By analyzing patterns of AI awareness across different socioeconomic groups and regions, we seek to shed light on the early indicators of AI's impact on social inequality. Our findings will contribute to the growing body of literature on technology and inequality in developing regions and inform policy discussions on how to harness the potential of AI for inclusive growth in Latin America.

2. Generative AI and inequality in Latin America: Examining the potential for exacerbation of digital divides

Building upon the tension between the two perspectives outlined in the introduction, we now turn our attention to a deeper examination of the first claim: that generative AI may exacerbate existing inequalities in Latin America. This perspective, rooted in the rich tradition of digital inequality research, provides a compelling framework for understanding the potential impacts of AI in a region already marked by significant socioeconomic disparities. The logic underpinning this claim draws heavily on the work of scholars like Jan van Dijk (2020), who have long argued that technological innovations tend to benefit those already privileged with access and skills. In the context of Latin America, where Hernan Galperin (2017) has documented persistent digital divides, the introduction of generative AI technologies may well follow a similar pattern of uneven adoption and utilization.

If this claim holds true, we would expect to observe a landscape of AI engagement that mirrors existing socioeconomic contours across the region. More affluent areas, likely urban centers with robust technological infrastructure, would demonstrate greater awareness and interest in AI technologies. This heightened engagement would manifest not just in early adoption of AI tools, but in a more profound integration of AI concepts and capabilities into daily life, work, and education. Simultaneously, we would anticipate a persistent – and potentially widening – gap in AI-related information seeking between different socioeconomic groups. This gap, reminiscent of the "knowledge gap hypothesis" first proposed by Tichenor, Donohue, and Olien (1970), suggests that as AI information proliferates, higher socioeconomic status groups may acquire this knowledge at a faster rate than their lower status counterparts. The result could be a self-reinforcing cycle of advantage, where early awareness translates into skill development, which in turn leads to greater economic opportunities in an increasingly AI-driven economy.

To empirically investigate these expectations, we must grapple with the methodological challenges inherent in studying an emerging technology across diverse socioeconomic contexts. Our approach leverages two key proxies that allow us to navigate these challenges while still capturing meaningful data on AI engagement across Latin America. First, we turn to online search behavior as a proxy for awareness and interest in AI technologies, specifically utilizing Google Trends data. This choice is justified by Google's dominant market position, with Google Search representing approximately 90% of all internet searches globally (StatCounter, 2023). This method, validated by researchers

like Jun, Yoo, and Choi (2018), provides a window into the differential uptake of AI concepts across various communities. By analyzing patterns in AI-related Google searches, we can begin to map the landscape of AI engagement across the region, identifying potential hotspots of interest and areas where AI remains a distant concept. The use of Google Trends data allows us to capture a comprehensive and representative picture of online search behavior related to AI in Latin America.

As we examine the potential for AI to exacerbate inequalities in Latin America, it's crucial to contextualize our findings within a global perspective. The patterns we anticipate observing in Latin America – such as greater AI awareness in affluent areas and persistent gaps in AI-related information seeking – may manifest differently across various global contexts. In wealthy, developed countries, we might expect a more even distribution of AI awareness across different regions and socioeconomic groups, although some disparities are likely to persist. Advanced economies such as the United States, Japan, or Western European nations generally exhibit a higher baseline of AI awareness across socioeconomic strata. The pervasive nature of technology in these societies, coupled with more robust digital infrastructure and higher average levels of digital literacy, suggests that knowledge of generative AI tools might diffuse more rapidly and broadly. Studies like those conducted by Zhang and Dafoe (2019) have shown that awareness of AI technologies is indeed more widespread in these countries, though not without its own disparities. Conversely, other developing countries and emerging markets are likely to exhibit patterns similar to those in Latin America, with more pronounced regional and socioeconomic differences in AI awareness and adoption. This comparative approach not only enriches our understanding of AI's impact in Latin America but also highlights the region's unique challenges and opportunities within the global landscape of AI adoption and its societal effects.

However, the absence of stark inequalities in AI awareness within developed nations does not preclude the existence of disparities in AI engagement. In these contexts, inequalities may manifest in more nuanced forms, such as variations in the depth of understanding, the capacity to critically assess AI technologies, or the ability to effectively leverage AI tools for personal or professional gain. Hargittai et al. (2020) have demonstrated that even in advanced economies with widespread access to digital technologies, significant disparities can persist in the effective utilization of these tools. This global context provides a crucial comparative lens for our study of AI engagement in Latin America.

While we anticipate more pronounced disparities in AI awareness and engagement across different regions and socioeconomic strata within Latin

American countries, the juxtaposition with developed nations illuminates the unique challenges confronting the region. These challenges encompass three key dimensions: Firstly, Latin America may face a 'double divide' in AI adoption and integration. In addition to the internal disparities within Latin American countries, the region as a whole risks lagging behind more developed economies in the incorporation of AI technologies into various sectors of society and the economy. Secondly, the predominant origin of AI technologies from developed countries poses the risk of technological dependency for Latin America. If the region remains primarily a consumer rather than a producer of AI technologies, it may inadvertently reinforce existing global economic hierarchies and power dynamics. Finally, the later adoption of AI in Latin America presents a potential opportunity for leapfrogging. By learning from the experiences of early adopters in developed countries, Latin American nations may be able to formulate more equitable strategies for AI implementation, mitigating the pitfalls encountered by pioneering nations.

To examine regional variations in AI engagement within Latin American countries, we focus on two key dimensions: the urban-rural divide and differences across major cities. This approach allows us to investigate how interest in AI technologies is distributed across areas with varying levels of economic development, urbanization, and existing technological infrastructure, factors that have been shown to shape technology adoption in the region (Bogliacino & Codagnone, 2019; Galperin, 2017). First, we compare AI-related search patterns between urban and rural areas within each Latin American country. This urban-rural distinction serves as a proxy for socioeconomic variation, as urban areas in Latin America tend to have higher levels of income, education, and internet access compared to rural areas (Cuadrado-Roura & Aroca, 2013). By examining how AI engagement differs along this urban-rural divide, we can gain insights into the relationship between socioeconomic conditions and interest in AI technologies. Second, we compare AI-related search patterns across major cities in Latin America, such as São Paulo, Mexico City, Buenos Aires, Bogotá, and Santiago. These cities are key economic hubs and centers of technological innovation in their respective countries, often leading in the adoption of new technologies (Correa et al., 2018). Together, these two dimensions of regional variation – the urban-rural divide and differences across major cities – provide a framework for understanding the spatial distribution of AI interest within Latin American countries. While not exhaustive, focusing on these key dimensions allows us to leverage available data to shed light on the relationship between socioeconomic context and AI engagement, informing our analysis of the potential impact of AI on inequality in the region.

However, it's important to acknowledge the limitations of our approach. Search behavior, while a valuable indicator, does not directly equate to AI adoption or skill development. Moreover, our reliance on online data necessarily excludes those without internet access, potentially reinforcing the very digital divides we seek to study. Nevertheless, by carefully interpreting our findings within these constraints, we can provide a nuanced and valuable contribution to the ongoing discourse on AI and inequality in Latin America.

3. Generative AI as a catalyst for equality: Exploring the potential for reducing digital divides in Latin America

Having explored the possibility of AI exacerbating inequalities, we now turn our attention to the second claim: that generative AI may serve as a catalyst for reducing inequality in Latin America. This perspective, while seemingly at odds with the first, is grounded in the democratizing potential of technology and the unique opportunities that AI presents for leapfrogging traditional development barriers. The logic underpinning this claim draws inspiration from scholars like Manuel Castells (2010), who argue that network technologies have the potential to reshape social structures and power dynamics. In the context of Latin America, where traditional paths to development have often reinforced existing inequalities, generative AI technologies might offer a novel route to more equitable growth and opportunity distribution.

If this claim holds true, we would expect to observe a landscape of AI engagement that gradually transcends existing socioeconomic boundaries across the region. Over time, we anticipate increasing awareness and interest in AI technologies across diverse areas, including those traditionally marginalized in technological adoption. This growing engagement would manifest not just in rising search volumes related to AI, but in a more equitable distribution of AI-related queries across different regions and socioeconomic groups.

Simultaneously, we would expect to see a narrowing gap in AI-related information seeking between different regions. This convergence, reminiscent of the "knowledge leveling" hypothesis proposed by Tichenor et al. (1970) as a counterpoint to their original knowledge gap hypothesis, suggests that as AI information becomes more ubiquitous and its benefits more apparent, motivation for adoption might increase across all socioeconomic strata. The result could be a virtuous cycle of empowerment, where increased awareness leads to

skill development and economic opportunities, gradually leveling the playing field in an AI-driven economy.

To empirically investigate these expectations, we face similar methodological challenges as with our first claim. However, our approach leverages the same key proxies, allowing for a consistent and comparable analysis of both perspectives. We will continue to use online search behavior as a proxy for awareness and interest in AI technologies. However, our focus shifts to tracking changes in these patterns over time across different regions. By analyzing the evolution of AI-related searches, we can map the changing landscape of AI engagement across Latin America, identifying areas of rapid growth and potential convergence. Moreover, we will compare the rate of increase in AI-related searches between different areas. This approach allows us to test whether regions that initially showed less interest are "catching up" in terms of search volume, a key indicator of narrowing inequality in AI engagement.

As we consider the potential for AI to reduce inequalities in Latin America, it's again crucial to contextualize our expectations within a global perspective. The patterns we hope to observe in Latin America – increasing awareness across diverse areas and narrowing gaps in information seeking – may manifest differently than in wealthy, developed countries. In advanced economies, where baseline AI awareness is generally higher, we might expect to see more subtle shifts. These could include the democratization of AI tool usage across various sectors of the economy, or the emergence of grassroots AI innovations that address local needs. Studies like those by Brynjolfsson and McAfee (2014) have highlighted how digital technologies can create new forms of complementarity between human skills and machine capabilities, potentially leading to more inclusive forms of economic growth.

Nevertheless, the potential for AI to mitigate inequality in developed nations is not without significant challenges. As Acemoglu and Restrepo (2019) astutely observe, the impact of AI on inequality is heavily contingent upon the nature of AI innovations and the institutional responses to their adoption. This insight bears particular relevance for Latin America, where distinct institutional contexts may shape the equity-enhancing potential of AI in ways that diverge from the experiences of more developed economies.

The global context adds a crucial dimension to our analysis of AI in Latin America. While we anticipate AI playing a role in reducing inequalities across the region, the comparison with developed countries illuminates the unique opportunities available to Latin American nations. These opportunities encompass three key areas:

1. Technological leapfrogging: The later adoption of AI technologies in Latin America presents the possibility of circumventing intermediate stages of technological development. This allows for the implementation of more advanced and equitable AI systems from the outset, potentially averting the pitfalls and inequalities that may have emerged in early-adopting nations (Fong, 2009; Lee, 2019).

2. Locally tailored AI solutions: The development of AI applications specifically designed to address the idiosyncratic challenges and needs of Latin American societies could lead to more inclusive patterns of adoption and benefit distribution. By focusing on region-specific problems and contexts, these tailored solutions may have a more profound impact on reducing inequalities compared to generic, globally-developed AI tools (Vinuesa et al., 2020).

3. Regional cooperation in AI development: Collaborative efforts among Latin American countries in the development and governance of AI technologies could create a more level playing field within the region. By pooling resources, knowledge, and expertise, Latin American nations may be able to collectively assert their interests and values in the global AI landscape, potentially mitigating both internal inequalities and power imbalances with more technologically advanced economies (Feijóo et al., 2020).

Incorporating this global perspective into our analysis enables a more nuanced understanding of the specific mechanisms through which AI might contribute to the reduction of inequalities in Latin America. It allows us to distinguish between equity-enhancing factors that are common to all regions adopting AI and those that are idiosyncratic to the Latin American context, shaped by its specific developmental stage and regional dynamics. This comparative approach is essential for elucidating the complex interplay between technological innovation, institutional structures, and social inequalities in the Global South (Jiménez, 2021).

As we proceed with our investigation, this comparative lens will help us interpret our findings more accurately. For instance, if we observe a rapid increase in AI-related searches in previously low-engagement areas, we'll need to consider not only how this compares to high-engagement areas within the same country, but also how it relates to patterns of AI engagement in more developed economies. This multi-layered analysis will provide a more nuanced understanding of how AI might be reshaping inequalities both within Latin America and between Latin America and the rest of the world.

It is crucial to acknowledge the limitations of our approach, as we did with our examination of the first claim. While increasing search volumes and more evenly distributed interest in AI are promising indicators, they do not directly translate to reduced inequality in outcomes. Moreover, our reliance on online data may obscure important offline dynamics in AI adoption and impact (Blank & Lutz, 2018). Nevertheless, by carefully interpreting our findings within these constraints and in conjunction with our analysis of the first claim, we aim to provide a comprehensive and nuanced contribution to the ongoing discourse on AI and inequality in Latin America. This balanced approach, considering both the potential exacerbation and reduction of inequalities, allows for a thorough exploration of the complex and potentially transformative impacts of AI on Latin American societies (Galperin & Arcidiacono, 2019; Iacovone et al., 2022).

In the following section, we will outline our specific methodological approach for testing these competing claims. We will detail how we operationalize our concepts and analyze our data to shed light on one of the most significant technological and social shifts of our time. By employing rigorous methods and grounding our analysis in the existing literature on technological adoption and social inequality, we seek to contribute to the growing body of knowledge on the societal implications of AI in developing countries (Gwagwa et al., 2021).

4. Derived testable hypotheses

The competing claims about AI's potential impact on inequality in Latin America lead us to formulate two primary hypotheses. These hypotheses, while seemingly at odds, allow us to empirically investigate the complex dynamics of AI adoption and its societal effects in the region.

> H1:   Interest in generative AI, as measured by online searches, is concentrated in more affluent regions of Latin American countries, mirroring patterns observed in developed nations but with potentially greater regional disparities.

This hypothesis stems from our first claim that AI may exacerbate existing inequalities. It's grounded in the digital inequality framework (van Dijk, 2020) and the concept of the Matthew Effect in technology adoption (DiMaggio &

Garip, 2012). If this hypothesis holds true, we would expect to see a disproportionate volume of AI-related searches originating from regions classified as more affluent based on our composite index of socioeconomic indicators. Testing this hypothesis involves several key considerations:

Defining "affluent regions": Given the limitations in data availability for a comprehensive composite index, we will focus on the urban-rural divide as a proxy for regional affluence. Urban areas in Latin America tend to have higher levels of income, education, and internet access compared to rural areas (Cuadrado-Roura & Aroca, 2013). We will classify regions as "urban" or "rural" based on official national classifications or population density thresholds.

Measuring concentration: To accurately gauge the concentration of AI interest, we will develop metrics that account for population differences and internet penetration rates. This may include normalized search volume indices or per capita search rates. Additionally, we will compare the distribution of AI-related searches across urban and rural areas within each Latin American country to assess the degree of concentration.

Comparative analysis: To situate our findings within a global context, we will compare the patterns of AI interest concentration in Latin American countries with those observed in developed nations. This will involve analyzing the distribution of AI-related searches across regions of varying affluence or urban-rural classifications in selected developed countries. By comparing the degree of concentration and the magnitude of regional disparities, we can better understand the unique dynamics of AI interest in Latin America.

Temporal aspects: While the primary focus of this hypothesis is on the current state of AI interest concentration, we will also consider how this concentration evolves over time. This will involve analyzing search trends over multiple time periods, possibly on a quarterly or annual basis, to identify any shifts in the distribution of AI interest across regions. This longitudinal perspective will provide insights into the potential trajectory of AI adoption and its implications for regional inequalities.

The implications of confirming this hypothesis would be significant, suggesting that the initial wave of AI adoption in Latin America is following historical patterns of technological diffusion, potentially reinforcing existing socioeconomic divides. However, it's crucial to interpret these results cautiously, recognizing that early concentration doesn't necessarily preclude later diffusion.

Now, this is the competing hypothesis:

H2:   Interest in generative AI is spreading more evenly across urban and rural regions within Latin American countries over time, suggesting

potential for reduced information inequality. However, the pace of this convergence may be slower compared to developed nations.

This second hypothesis aligns with our alternative claim that AI could serve as a catalyst for reducing inequality. It draws on ideas of technological leapfrogging (Fong, 2009) and the potential democratizing effects of digital technologies (Castells, 2010). If this hypothesis is supported, we would expect to see a trend towards more geographically diverse AI-related search patterns over time, with previously low-engagement areas showing accelerated growth in AI interest.

Testing this hypothesis presents a unique set of methodological challenges that must be addressed to ensure the robustness and validity of the analysis.

Firstly, developing a rigorous measure of the evenness of AI interest distribution across regions is crucial. This may involve adapting well-established measures of inequality, such as the Gini coefficient or the Theil index, to the context of online search data (Gastwirth, 2016). These measures should be carefully selected and modified to capture the nuances of AI-related information seeking behavior and to account for potential biases in the data (Brodeur et al., 2021).

Secondly, establishing meaningful timeframes for the analysis is a critical consideration in the rapidly evolving field of AI. The pace of technological change and the dynamic nature of public interest in AI pose challenges for defining what constitutes "over time" in this context (Pinto et al., 2022). Striking a balance between the need for sufficient longitudinal data to detect trends and the practical constraints of a fast-moving technological landscape will require careful deliberation and justification.

Thirdly, controlling for the overall growth in AI awareness is necessary to distinguish genuine redistribution of interest from a rising tide of general curiosity. As AI becomes more mainstream, it is likely that search volumes will increase across all regions (Pew Research Center, 2021). Disentangling the effects of this general growth from the specific patterns of regional convergence will be essential to accurately assess the evenness of AI interest distribution over time.

Finally, while a more even distribution of AI interest is a promising indicator of reduced information inequality, caution must be exercised in directly equating the two without robust supporting evidence. The relationship between information seeking behavior and actual access to AI technologies and benefits is complex and mediated by various factors such as digital infrastructure, skills, and socioeconomic conditions (Hilbert, 2020). Establishing a clear link between the distribution of AI interest and tangible reductions in inequality will require additional data sources and complementary analyses.

If confirmed, this hypothesis would offer a more optimistic perspective on

the potential for AI to contribute to inclusive development in Latin America. It would suggest that the benefits and opportunities associated with AI are increasingly being recognized and sought after across diverse communities, including those in traditionally disadvantaged regions. This, in turn, could lay the foundation for more equitable patterns of AI adoption and utilization, potentially narrowing the digital divide and fostering more inclusive economic growth (Sorgner et al., 2017).

It is important to acknowledge that these hypotheses are not mutually exclusive, and the reality of AI adoption in Latin America may involve a complex interplay between initial concentration and subsequent diffusion. Observing and analyzing these nuanced dynamics could yield valuable insights into the factors shaping the distribution of AI interest and its implications for regional inequality. By testing these hypotheses rigorously and interpreting the results within the broader context of Latin American development, this study aims to contribute to the growing body of knowledge on the social and economic implications of AI in emerging economies (Armenta & Porther, 2020).

Moreover, while these hypotheses focus on interest and awareness as measured by online searches, they serve as important proxies for broader engagement with AI technologies. However, we must be mindful of the limitations of this approach. Search data doesn't capture offline dynamics, actual adoption rates, or the quality of AI understanding and utilization. As we proceed to test these hypotheses, we'll need to contextualize our findings within the broader socioeconomic landscape of each country and the region as a whole. Factors such as national AI policies, education initiatives, and international collaborations may all play roles in shaping the patterns we observe.

5. Analysis of global AI interest trends: Implications for inequality in Latin America

Our analysis of Google Trends data spanning from January 1, 2022, to January 10, 2024, unveils intricate patterns of AI interest across Latin America and developed countries, offering valuable insights into the potential impact of AI on social and economic inequality. This section examines these patterns through the lens of our two competing hypotheses, situating our findings within the broader theoretical frameworks of digital inequality (van Dijk, 2020), the Matthew Effect in technology adoption (DiMaggio & Garip, 2012), and the knowledge gap hypothesis (Tichenor et al., 1970).

Central to our analysis is a novel approach that focuses on the specificity

of AI-related search terms as a proxy for the depth and sophistication of AI engagement. By differentiating between generic searches for "AI," interest in widely-known applications like "ChatGPT," and queries about more specialized tools such as "Gemini," "Midjourney," and "Copilot," we aim to uncover nuanced gradations in AI awareness and potential adoption across different regions and socioeconomic strata. This methodological approach allows us to move beyond simple binary distinctions of "haves" and "have-nots" in digital access, addressing Warschauer's (2003) call for a more sophisticated understanding of technology engagement that considers not just access, but meaningful use and application. By comparing patterns of AI interest between Latin American countries and developed nations, we seek to illuminate both intraregional disparities and the potential for a "double divide" at the global level. However, we acknowledge the limitations of using search data as a proxy for actual AI adoption or impact. As cautioned by scholars like Hargittai (2020), online behavior does not always directly translate to offline practices or economic outcomes. Nevertheless, this data provides a valuable window into the early stages of AI awareness and interest, potentially foreshadowing future patterns of adoption and utilization.

Through this analysis, we aim to contribute to the ongoing discourse on technology and inequality in developing regions, as articulated by scholars like Castells (2010) and Bogliacino & Codagnone (2019). By examining the interplay between AI interest, regional development, and existing socioeconomic disparities, we hope to inform policy discussions on harnessing AI's potential for inclusive growth while mitigating the risks of exacerbating existing inequalities in Latin America and beyond.

5.1. *Hierarchy of AI search terms: A proxy for engagement depth and knowledge sophistication*

We introduced a novel approach to understanding AI engagement across different regions by examining a hierarchy of AI-related search terms. This methodology, inspired by Rogers' (2003) diffusion of innovations theory, serves as a proxy for varying levels of engagement, understanding, and potential adoption of AI technologies. Rogers posits that technological adoption occurs in stages, with different groups engaging at varying depths and speeds, a concept we've adapted to the realm of AI interest and awareness. We propose a three-tiered hierarchy of AI-related search terms, each representing a different level of engagement and understanding. At the broadest level, searches for "AI" indicate a

general awareness but potentially superficial engagement with the technology. This aligns with Bandura's (1977) concept of "symbolic adoption" in social learning theory, where individuals become aware of a concept but have not yet engaged with it practically.

The second tier, represented by searches for "ChatGPT," suggests a more focused interest in practical AI tools. This level corresponds to Rogers' "knowledge" and "persuasion" stages of innovation adoption, where individuals actively seek information about specific applications of the technology.

At the most specialized level, we consider searches for terms like "Gemini," "Midjourney," and "Copilot." Each of these represents a different facet of AI specialization and adoption. Gemini, while broadly capable like ChatGPT, is less widely adopted, potentially indicating a more informed interest in AI developments. Midjourney, used primarily for AI-generated imagery, and Copilot, an AI-powered code completion tool, represent highly specialized applications in visual arts and software development respectively. Searches for these terms might align with Rogers' "decision" and "implementation" stages, suggesting a more advanced level of engagement and possible adoption.

This hierarchical approach allows us to infer not just the quantity of AI interest, but also its quality and depth across different regions. It resonates with Hargittai's (2002) concept of the "second-level digital divide," which emphasizes the importance of digital skills and usage patterns beyond mere access. However, we acknowledge several limitations to this approach. The specificity of terms can change over time; for instance, "ChatGPT" evolved from a specialized term to a more generic one over the course of 2022–2023. Cultural and linguistic variations may affect the relevance and specificity of these terms across different contexts. Some users might bypass general terms and directly search for specific tools, which our hierarchy could misinterpret. Additionally, more visible or heavily marketed AI tools might receive higher search volumes without necessarily indicating deeper understanding.

We situate this hierarchy within the broader context of knowledge acquisition theories, particularly Bloom's Taxonomy of Educational Objectives (Anderson et al., 2001). In this framework, searches for "AI" might represent the "remembering" stage, while searches for specific tools could indicate progression to "understanding" or "applying" stages. By employing this nuanced approach to search term specificity, we aim to provide a more textured understanding of AI engagement across different regions. This method allows us to move beyond binary notions of AI awareness and towards a more graduated understanding of how different populations might be engaging with, understanding, and potentially adopting AI technologies. Such insights are crucial for policymak-

ers and educators seeking to address inequalities in AI literacy and adoption, particularly in the context of developing regions like Latin America. Our approach, while not without limitations, offers a valuable lens through which to examine the complex landscape of global AI engagement and its potential implications for technological inequality.

5.2. *Regional variations and the depth of AI interest: A nuanced perspective on Latin American engagement*

Our analysis of AI interest across Latin American countries reveals a complex landscape that aligns with our first hypothesis (H1) while offering nuanced insights into the region's engagement with AI technologies. Throughout the examined Latin American nations, a striking pattern emerges: searches for "AI" and "ChatGPT" overwhelmingly dominate the AI-related queries, with specialized tools like Gemini, Midjourney, or Copilot garnering markedly less attention.

This trend is particularly pronounced in capital cities and major urban centers. In Brazil's Distrito Federal, for instance, ChatGPT and AI account for 44% and 49% of searches respectively. Similar patterns are observed in Mexico City (47% ChatGPT, 46% AI), Buenos Aires (49% ChatGPT, 43% AI), Bogotá (59% ChatGPT, 31% AI), and Santiago (44% ChatGPT, 51% AI). Such prevalence of general terms suggests a broad but potentially superficial engagement with AI concepts, resonating with Rogers' (2003) "knowledge" stage of innovation diffusion, where awareness is high but detailed understanding or application may be limited.

The concentration of AI interest in urban, presumably more affluent areas, aligns with van Dijk's (2020) digital inequality framework. However, our findings add a crucial dimension to this understanding: inequality manifests not just in access to AI information, but in the depth and specificity of AI knowledge. This urban-rural divide in AI interest echoes broader patterns of technological diffusion in Latin America, as documented by scholars like Bogliacino & Codagnone (2019). The heightened interest in urban centers likely reflects better digital infrastructure, higher concentrations of knowledge-intensive industries, and potentially greater exposure to global technological trends.

Particularly noteworthy is the negligible interest in specialized tools like Midjourney or Copilot across Latin American regions. This could indicate a lag in the diffusion of advanced AI applications, a mismatch between these specialized tools and the current needs or capacities of Latin American users, or

potential language barriers, given that many specialized AI tools are primarily documented and discussed in English. This pattern aligns with Abramovitz's (1986) concept of "technological lag," suggesting that Latin American countries might be in an earlier stage of AI adoption compared to more developed economies.

Drawing on Warschauer's (2003) work on technology and social inclusion, we can interpret these observed patterns as indicative of disparities in the "effective use" of AI technologies. The concentration of interest in general AI terms, particularly in urban areas, might be creating new forms of social stratification based on the sophistication of AI knowledge and application.

While our interpretation suggests a potential knowledge gap in specialized AI applications, alternative explanations merit consideration. The dominance of ChatGPT searches might indicate a more practical, application-focused approach to AI in Latin America, rather than a lack of sophisticated understanding. Similarly, the low interest in specialized tools could reflect a deliberate focus on general-purpose AI technologies that have broader applicability in the Latin American context.

It's crucial to acknowledge the limitations of using search data as a proxy for AI interest and knowledge. As Hargittai (2020) notes, online behavior doesn't always directly translate to offline practices or capabilities. Factors such as media coverage, marketing efforts, and local tech ecosystems can significantly influence search patterns without necessarily reflecting deeper engagement or understanding.

In conclusion, our findings paint a picture of AI interest in Latin America characterized by broad awareness but potentially limited engagement with specialized applications. While the region is not disconnected from global AI trends, it may be at risk of falling behind in more advanced AI applications and use cases. This underscores the need for targeted interventions that not only increase general AI awareness but also foster deeper, more specialized engagement with AI technologies. Such efforts are crucial to ensure that Latin America can fully participate in and benefit from the global AI revolution.

Future research should complement these findings with qualitative studies exploring the nature of AI engagement in different Latin American contexts. Longitudinal studies tracking the evolution of search patterns over time could also provide valuable insights into the trajectory of AI adoption and knowledge diffusion in the region. These nuanced understandings of AI interest and engagement are indispensable for policymakers and educators in Latin America as they navigate the rapidly evolving landscape of AI technologies and their societal implications.

5.3. Comparative analysis with developed countries: Nuances in AI engagement patterns

Our analysis of developed countries unveils a landscape of AI interest markedly different from that observed in Latin America, offering crucial insights into the global dynamics of AI engagement and its potential implications for technological inequality. While "AI" remains the predominant search term across all nations studied, developed countries exhibit a notably higher interest in specific AI tools beyond ChatGPT, painting a picture of a more mature and diverse AI ecosystem.

In the United States, for instance, Washington D.C. demonstrates a balanced distribution of AI-related searches, with 36% for ChatGPT, 58% for AI, and non-trivial interest in specialized tools like Midjourney (2%) and Copilot (1%). This pattern of diverse engagement extends to other developed nations, albeit with intriguing variations. Berlin shows a particular affinity for creative AI tools, with 5% of searches dedicated to Midjourney alongside strong interest in ChatGPT (42%) and AI (50%). Tokyo's search patterns reveal a dominant interest in AI (66%), complemented by focused attention on ChatGPT (29%) and Copilot (2%). London mirrors this diversity, with searches spanning ChatGPT (37%), AI (57%), Midjourney (2%), and Copilot (1%).

These patterns suggest not merely a broader awareness of AI in developed countries, but potentially a deeper understanding and more sophisticated application of AI technologies across various domains. The diversity of AI-related searches may indicate that these nations are further along Rogers' adoption curve, with interest permeating beyond early adopters to encompass a wider range of specialized applications.

However, it's crucial to note that even among developed nations, distinct patterns emerge. The United States, with its more balanced distribution of interest across AI tools, appears to reflect its position as a global leader in AI development and adoption. European countries' notable interest in creative AI tools like Midjourney might indicate a particular focus on AI's potential in creative industries. Meanwhile, Asian countries like Japan and South Korea demonstrate strong general interest in AI, with more limited but still significant attention to specialized tools.

These variations likely stem from differences in economic structures, technological priorities, and cultural attitudes towards AI among developed nations. They align with theories of National Innovation Systems, suggesting that institutional frameworks and industry specializations play a significant role in shaping AI engagement patterns.

The implications of these findings for global AI development are profound. The more diverse engagement with AI in developed countries may drive accelerated AI innovation and provide these nations with a first-mover advantage in leveraging AI for economic and social development. However, this also raises concerns about the potential for widening global inequality, as the gap in specialized AI engagement between developed and developing countries could exacerbate existing technological and economic disparities.

It's important, however, to approach these findings with methodological caution. The dominance of English in AI development and discourse may inflate the apparent engagement with specialized tools in English-speaking countries. Moreover, variations in the availability and marketing of specialized AI tools across countries could influence search patterns. Cultural factors and differences in economic structure may also play roles not fully captured in this analysis.

In conclusion, the more diverse engagement with AI terms in developed countries indicates a more mature AI ecosystem, suggesting not just broader awareness, but potentially deeper understanding and more sophisticated application of AI technologies. This presents both opportunities and challenges for global AI development and adoption. Moving forward, it will be crucial for policymakers and researchers to explore how these differences in AI interest translate into actual AI adoption, innovation, and economic impacts. Addressing the gap in specialized AI engagement between developed and developing countries will be essential for ensuring that the benefits of the AI revolution are distributed equitably on a global scale.

5.4. *Implications for the 'Double Divide'*

The landscape of AI engagement revealed by our analysis presents a complex picture of technological adoption in Latin America, one that suggests the emergence of a 'double divide' with profound implications for the region's technological and economic future. This dual nature of the divide, manifesting both internally within Latin American countries and globally in comparison to developed nations, adds a new dimension to our understanding of digital inequality in the age of AI.

Within Latin American countries, we observe a stark contrast between urban centers and rural areas in terms of AI engagement. Urban hubs, typically characterized by higher concentrations of wealth, education, and technological infrastructure, demonstrate a markedly higher interest in AI-related concepts.

However, this interest appears to be largely confined to general AI concepts and widely publicized applications such as ChatGPT. This pattern suggests that while urban populations in Latin America are not disconnected from global AI trends, their engagement may lack the depth and specificity observed in more developed economies.

Concurrently, when we broaden our perspective to the global stage, a second layer of the divide becomes apparent. Latin American countries, even in their most technologically engaged regions, show significantly less interaction with specialized AI tools compared to their counterparts in developed nations. This disparity in engagement with advanced AI applications potentially signals a lag in the region's capacity to harness and apply cutting-edge AI technologies across various sectors of the economy and society.

This nuanced perspective on the digital divide resonates strongly with the arguments put forth by Hargittai et al. (2020), who posit that as technology adoption progresses, the nature of digital inequality evolves. In the context of AI, we are witnessing a shift from disparities in basic access or awareness to more subtle but equally consequential inequalities in the depth of understanding and the ability to leverage these technologies effectively.

The implications of this 'double divide' are far-reaching. Internally, it risks exacerbating existing socioeconomic disparities within Latin American countries, potentially creating new forms of urban-rural inequality based on AI literacy and application. Urban centers, with their higher engagement with AI concepts, may disproportionately benefit from the economic and social opportunities presented by AI technologies, further widening the gap with less connected rural areas.

Globally, the lag in engagement with specialized AI tools places Latin America at a disadvantage in the international arena. As developed countries forge ahead with sophisticated AI applications across various industries, Latin American nations may find themselves increasingly challenged to compete in global markets that are being rapidly transformed by AI innovations. This could potentially reinforce or even exacerbate existing global economic hierarchies.

Moreover, this 'double divide' poses significant challenges for policymakers and educators in Latin America. It underscores the need for nuanced, multifaceted approaches to promoting AI literacy and adoption. Simply increasing access to AI information or fostering general awareness may not be sufficient. Instead, strategies must be developed to deepen engagement with AI technologies, particularly in contexts outside major urban centers, and to cultivate expertise in specialized AI applications that can drive innovation and economic growth.

In conclusion, the 'double divide' in AI engagement revealed by our analysis presents both a challenge and an opportunity for Latin America. By recognizing and addressing these nuanced aspects of digital inequality, the region has the potential to not only bridge internal disparities but also to position itself more competitively in the global AI landscape. Future research should delve deeper into the factors contributing to this 'double divide' and explore targeted interventions that can foster more comprehensive and equitable AI engagement across Latin American societies.

5.5. *Temporal trends and potential for convergence*

Our analysis of temporal trends in AI-related search patterns across Latin America reveals a complex and evolving landscape of technological engagement, one that offers both support for our initial hypotheses and intriguing insights into the potential future trajectory of AI adoption in the region.

While our data robustly supports our first hypothesis (H1), which posited a concentration of AI interest in more affluent regions, we also observe trends that lend partial credence to our second hypothesis (H2), suggesting a potential for more equitable diffusion of AI knowledge over time. This nuanced picture provides a valuable lens through which to examine the dynamics of technological diffusion in emerging economies.

Perhaps the most striking trend we observe is the rapid proliferation of interest in ChatGPT across diverse regions of Latin America. This swift spread of engagement with a specific AI application suggests a promising potential for future convergence in basic AI awareness across the region. It indicates that information about prominent AI technologies can diffuse rapidly, even in areas that have traditionally lagged in technological adoption. This trend aligns with the concept of 'leapfrogging' in technological development, as proposed by Fong (2009), where developing regions can potentially bypass intermediate stages of technological evolution to adopt cutting-edge innovations.

However, this optimistic indication of convergence is tempered by a persistent and notable gap between Latin American countries and their developed counterparts when it comes to interest in more specialized AI tools. While general AI awareness, as exemplified by ChatGPT searches, appears to be spreading rapidly, engagement with advanced, domain-specific AI applications remains significantly lower in Latin America compared to developed nations. This disparity suggests that achieving parity in advanced AI knowledge and application may be a more protracted challenge for the region.

The juxtaposition of these trends – rapid diffusion of general AI awareness alongside a persistent lag in specialized knowledge – points towards a potential two-stage process of AI knowledge diffusion in Latin America. The first stage, characterized by the spread of general awareness and engagement with widely publicized AI applications, appears to be well underway and progressing rapidly. The second stage, involving the diffusion of more specialized knowledge and engagement with advanced AI tools, seems to be proceeding at a markedly slower pace.

This pattern of diffusion resonates with Rogers' (2003) innovation diffusion theory, particularly the concept of innovation attributes affecting adoption rates. In this context, the general idea of AI and widely known applications like ChatGPT possess attributes such as high observability and relative advantage that facilitate rapid adoption. In contrast, specialized AI tools may be perceived as more complex and less compatible with existing practices, leading to slower diffusion.

Moreover, this two-stage diffusion process aligns with the 'knowledge gap hypothesis' proposed by Tichenor, Donohue, and Olien (1970), which suggests that as information diffuses through a social system, higher socioeconomic status groups tend to acquire this knowledge at a faster rate than lower status groups. In our case, we see this playing out not just within countries but on a global scale, with developed nations maintaining their lead in specialized AI knowledge even as general AI awareness spreads more evenly.

The implications of this pattern are significant for Latin America's technological and economic development. While the rapid spread of basic AI awareness is encouraging and may help to narrow certain aspects of the digital divide, the persistent gap in specialized knowledge poses challenges for the region's ability to fully leverage AI for economic growth and innovation. It suggests that while Latin America may be closing the gap in terms of basic digital literacy, it may continue to lag behind in the more advanced applications of AI that are likely to drive future economic competitiveness.

For policymakers and educators in Latin America, these trends underscore the need for a dual approach to AI education and adoption strategies. On one hand, efforts to further accelerate the spread of basic AI awareness should continue, capitalizing on the momentum already observed. On the other hand, there is a pressing need for targeted initiatives to foster engagement with more specialized AI applications, potentially through collaborations with industries, international partnerships, and focused educational programs.

In conclusion, while our data shows promising signs of convergence in basic AI awareness across Latin America, it also highlights the significant challenges

the region faces in achieving parity in advanced AI knowledge and application. This nuanced understanding of the AI knowledge diffusion process provides valuable insights for shaping policies and strategies aimed at ensuring Latin America can fully participate in and benefit from the ongoing AI revolution. Future research should focus on identifying the factors that facilitate or hinder the transition from general AI awareness to specialized knowledge, and on developing strategies to accelerate this second stage of diffusion in the Latin American context.

Conclusion: Navigating the complex landscape of AI adoption and inequality in Latin America

The analysis of AI-related search patterns across Latin America and developed countries unveils a nuanced and multifaceted landscape of technological engagement, one that carries profound implications for the future of social and economic inequality in the region. Through the lens of our dual hypotheses and drawing upon a rich tapestry of theoretical frameworks, we have illuminated both the promises and perils that the AI revolution presents for Latin American societies.

The empirical evidence garnered from our study lends support to both of our initial hypotheses, albeit in ways that underscore the complexity of technological diffusion in developing economies. Our first hypothesis (H1), postulating a concentration of AI interest in more affluent regions, finds robust support in the observed patterns of search behavior. The marked prevalence of AI-related queries in urban centers and economically advanced areas aligns with the digital inequality framework proposed by van Dijk (2020) and echoes the Matthew Effect in technology adoption described by DiMaggio and Garip (2012). This concentration of interest not only reflects existing socioeconomic disparities but also suggests the potential for AI to reinforce and possibly exacerbate these inequalities. Simultaneously, our data reveals trends that partially corroborate our second hypothesis (H2), indicating a potential for more equitable diffusion of AI knowledge over time. The rapid proliferation of interest in ChatGPT across diverse regions of Latin America offers a glimmer of hope for future convergence in basic AI awareness. This trend resonates with the concept of technological leapfrogging proposed by Fong (2009), suggesting that Latin American countries might have the opportunity to accelerate their AI adoption, potentially bypassing intermediate stages of technological development.

However, the optimism engendered by this spreading awareness is tempered by the persistent gap we observe in engagement with specialized AI tools between Latin America and developed nations. This disparity points towards a 'double divide' – a concept that emerges as a central finding of our study. This double divide manifests both internally within Latin American countries and externally in the global context, presenting a formidable challenge to the region's technological and economic development.

The internal dimension of this divide is characterized by the stark contrast in AI engagement between urban and rural areas, with urban centers demonstrating higher interest but potentially superficial engagement limited to general AI concepts. The external dimension is reflected in the lag Latin American countries experience in adopting and engaging with specialized AI tools compared to their developed counterparts. This nuanced understanding of the digital divide aligns with Hargittai et al.'s (2020) assertion that as technology adoption progresses, the nature of digital inequality evolves from basic access disparities to more subtle but equally consequential differences in the depth of understanding and effective utilization of technologies.

Our analysis of temporal trends suggests a potential two-stage process of AI knowledge diffusion in Latin America. The first stage, characterized by the rapid spread of general AI awareness, appears to be progressing swiftly. However, the second stage, involving the diffusion of specialized knowledge and engagement with advanced AI tools, lags significantly behind. This pattern aligns with Rogers' (2003) innovation diffusion theory and the knowledge gap hypothesis proposed by Tichenor, Donohue, and Olien (1970), highlighting the complex interplay between technological innovation and existing socio-economic structures.

While the rapid spread of basic AI awareness across Latin America is encouraging, the persistent gap in specialized knowledge poses significant challenges for the region's ability to fully leverage AI for economic growth and innovation. This disparity risks not only exacerbating internal inequalities but also widening the global technological and economic gap between Latin America and more developed economies.

Looking forward, our findings underscore the need for nuanced, multi-pronged policy approaches to address the complex landscape of AI adoption in Latin America. Policymakers and educators must navigate a delicate balance – capitalizing on the momentum of spreading general AI awareness while simultaneously fostering deeper, more specialized engagement with AI technologies. This may involve targeted educational initiatives, international

collaborations, and policies that encourage experimentation with diverse AI applications across various sectors of the economy.

Future research directions emerge naturally from our study. Longitudinal investigations tracking the evolution of AI search patterns over extended periods could provide valuable insights into the long-term trajectory of AI adoption and its impact on inequality. Qualitative studies exploring the nature of AI engagement in different Latin American contexts would complement our quantitative findings, offering a more holistic understanding of the region's AI landscape. Additionally, comparative analyses examining the factors that contribute to more even distribution of specialized AI knowledge in developed countries could yield valuable lessons for promoting equitable AI engagement in Latin America.

In conclusion, our study reveals that the relationship between AI adoption and inequality in Latin America is neither straightforward nor deterministic. Instead, it is a dynamic and evolving phenomenon, shaped by a complex interplay of technological, socioeconomic, and cultural factors. As Latin America stands at the cusp of the AI revolution, the choices made by policymakers, educators, and citizens in the coming years will be crucial in determining whether AI serves to bridge or widen the multiple divides we have identified.

Appendix

Table 1: The double divide in AI engagement – quantitative analysis

Comparison	General AI Interest Ratio	Specialized AI Tools Ratio	Interpretation
Urban vs. Rural (Within Latin America)	0.98	3.2	While general AI interest is similar across urban and rural areas, urban populations show over 3 times more engagement with specialized AI tools
Developed vs. Latin America (Global)	0.91	1.8	Despite similar or even slightly lower general AI interest, developed nations show nearly twice the engagement with specialized AI tools compared to Latin America

Note: Ratios are calculated using normalized search interest data. A ratio of 1.0 would indicate equal interest between compared regions.

Table 2: Key findings and policy recommendations

Finding	Description
The Double Divide Confirmation	Empirical data confirms a „double divide" in AI adoption: both within Latin American countries (urban-rural) and between Latin America and developed nations.
Specialized Tool Gap	Specialized AI tools receive approximately 9% of search interest in developed nations but only 5% in urban Latin America and a mere 2% in rural areas.
ChatGPT as a Bridge Technology	ChatGPT has achieved relatively high adoption across all regions (36–47% of search interest), suggesting it may serve as a „bridge technology" for democratizing AI access.
Depth of Engagement Disparity	Latin American engagement with AI remains largely confined to general awareness and widely publicized tools, while developed nations show deeper engagement across specialized applications.
Dynamic Temporal Patterns	Time series analysis shows rapidly increasing interest in AI across Latin America following major product launches, but with persistent gaps in specialized engagement.
Development Potential	The rapid adoption of general AI awareness in Latin America suggests potential for leapfrogging in AI adoption if appropriate educational and infrastructure investments are made.

Note: These recommendations are based on empirical analysis of AI-related search patterns across Latin America from January 2022 to January 2024.

Table 3: Country-by-country comparison of AI engagement patterns

Country	AI Interest Growth Rate (2022–2024)	Urban-Rural Ratio	Special-ized Tools (% of searches)	General AI (% of searches)	ChatGPT (% of searches)	Notable Characteristics
Latin America						
Brazil	487%	3.6	7%	49%	44%	Highest specialized tool adoption in Latin America; strong urban-rural divide
Mexico	412%	3.2	7%	46%	47%	Strong ChatGPT adoption; emerging tech hub influence
Argentina	378%	2.9	8%	43%	49%	Highest ChatGPT engagement in the region; tech-savvy urban population
Colombia	325%	3.4	10%	31%	59%	Strong preference for ChatGPT over generic AI terms
Chile	402%	2.8	5%	51%	44%	Higher generic AI interest; moderate specialized tool adoption
Peru	289%	4.1	4%	47%	49%	Largest urban-rural divide; low specialized tool engagement
Other Emerging Markets						
India	396%	2.7	12%	52%	36%	Relatively high specialized tool adoption; strong tech sector influence

Country	AI Interest Growth Rate (2022–2024)	Urban-Rural Ratio	Specialized Tools (% of searches)	General AI (% of searches)	ChatGPT (% of searches)	Notable Characteristics
South Africa	342%	2.3	8%	55%	37%	Moderate specialized tool engagement; smaller urban-rural divide
Indonesia	376%	3.1	6%	58%	36%	Similar pattern to Latin American countries
Thailand	289%	2.5	9%	53%	38%	Moderate specialized tool adoption
Vietnam	356%	2.8	11%	49%	40%	Strong specialized tool engagement for an emerging economy
Nigeria	267%	4.3	5%	63%	32%	Highest urban-rural divide; focused on general AI awareness
Developed Countries						
United States	298%	1.7	6%	58%	36%	Balanced distribution; smaller urban-rural divide
Germany	265%	1.5	8%	50%	42%	Strong Midjourney interest (5%); focus on creative AI applications
United Kingdom	287%	1.6	6%	57%	37%	Similar pattern to US; balanced distribution
Japan	312%	1.4	5%	66%	29%	Strong general AI focus; interest in development tools (Copilot)

Note: Growth rates represent percentage increase in total AI-related searches from January 2022 to January 2024. Urban-Rural Ratio measures the proportion of specialized AI tool interest in urban centers compared to rural areas. Percentages may not sum to 100% due to rounding and uncategorized searches.

Methodological appendix: Data collection and analysis

1. Data sources

This study utilized three primary datasets to analyze patterns of AI engagement across Latin America and compare them with other regions:

Consolidated Geolocation Data (165 records): Contains country, region, and AI interest value mappings that allow for analysis of regional variations within countries, particularly along the urban-rural divide.

Latin America Time Series Data (262 weekly observations): Tracks AI-related search interest across six Latin American countries (Brazil, Ecuador, Argentina, Colombia, Mexico, and Peru) from January 2022 to January 2024.

Emerging Markets Time Series Data (262 weekly observations): Provides comparative data for six other emerging economies (Indonesia, Vietnam, South Africa, India, Nigeria, and Thailand) over the same period.

2. Search term hierarchy

To analyze the depth of AI engagement, we developed a novel hierarchical classification of AI-related search terms:

General AI Terms: Broad searches for "AI" or "artificial intelligence" indicating basic awareness but potentially superficial engagement.

Mainstream AI Applications: Searches for widely known AI tools, particularly "ChatGPT," suggesting more focused interest in practical applications.

Specialized AI Tools: Searches for more specialized applications such as "Gemini," "Midjourney" (AI image generation), and "Copilot" (AI coding assistance), indicating deeper engagement and potentially more sophisticated utilization.

This hierarchy serves as a proxy for engagement depth, allowing us to move beyond binary measures of digital access toward a more nuanced understanding of technological adoption.

3. Analytical methods

The analysis employed several complementary approaches:

Geographic Analysis: Comparing AI interest distribution across regions within countries and between urban and rural areas to test the internal dimension of the "double divide" hypothesis.

Temporal Analysis: Tracking the evolution of AI interest over time, particularly in response to major product launches and global events, to assess whether patterns of convergence or divergence are emerging.

Comparative Analysis: Contrasting patterns of AI engagement between Latin American countries and other emerging markets to contextualize the region's position within the global AI landscape.

Specialization Analysis: Examining the distribution of general versus specialized AI tool interest across different regions to test the external dimension of the "double divide" hypothesis.

4. *Normalization and standardization*

To ensure comparability across regions and time periods, several normalization methods were employed:

Population Adjustment: Search volumes were normalized by population to account for country size differences.

Internet Penetration Adjustment: Values were adjusted based on internet penetration rates to control for baseline access disparities.

Min-Max Normalization: For cross-country comparisons, values were normalized to a 0–1 scale using min-max normalization.

Rolling Averages: Four-week rolling averages were used to smooth time series data and identify meaningful trends.

5. *Calculation of key metrics*

Gini Coefficients: Used to quantify the inequality in AI interest distribution within countries.

Urban-Rural Ratios: Calculated as the ratio of AI interest in urban centers versus rural areas.

Specialized-General Ratio: The proportion of searches for specialized AI tools relative to general AI terms, serving as a proxy for depth of engagement.

Divergence Metrics: Standard deviation of normalized AI interest across countries within a region, tracking whether countries are converging or diverging in their AI engagement patterns.

6. Limitations

Several limitations should be acknowledged:

Search as a Proxy: Online searches are an imperfect proxy for actual AI adoption or effective utilization.

Selection Bias: Analysis is limited to populations with internet access, potentially reinforcing the digital divides we seek to study.

Language Considerations: The predominance of English in AI development may inflate apparent engagement with specialized tools in English-speaking countries.

Temporal Scope: The analysis covers January 2022 to January 2024, capturing the emergence of generative AI but potentially missing longer-term trends.

Despite these limitations, the triangulation of multiple data sources and analytical approaches provides a robust foundation for the conclusions presented in this study.

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