Project report in sustAInability

Sustainable Truth

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1 Introduction

In an era where sustainability shapes the core of global discourse, discerning and scrutinizing underlying assumptions becomes paramount. As sustainability increasingly embeds itself into the decision-making fabric of organizations and individuals, it introduces a complex interplay of facts, assumptions, and beliefs. This complexity is amplified by the political and social dynamics influencing understanding and actions towards sustainable practices [7].

The critical challenge lies in identifying and validating these assumptions. Assumptions, often cloaked as facts, significantly influence policy formulation, strategic decisions, and individual behaviors. However, the inherent risk is the potential misalignment of these assumptions with reality, leading to decisions that may inadvertently hinder rather than promote sustainable outcomes. The task is not trivial; it involves disentangling deeply embedded beliefs from empirical evidence, a process fraught with intellectual and practical challenges [8].

In this context, the role of Artificial Intelligence emerges as a beacon of potential. With its advanced analytical capabilities, AI offers a promising avenue to systematically identify, extract, and validate assumptions embedded within the sustainability discourse [9]. This document explores how AI can be leveraged to navigate this complex terrain. The methodologies for extracting assumptions from textual information, representing these assumptions in a structured manner, and critically evaluating them against a dynamically evolving benchmark of truth are examined.

The exploration is grounded in real-life scenarios, examining prevalent sustainability assertions. The ultimate goal of this endeavor is to enhance decision-making processes by providing a clearer understanding of the assumptions that underpin them. By offering a more nuanced and evidence-based view of these assumptions, the aim is to facilitate more informed, sustainable choices and final decision aligned with current knowledge and emerging understandings of sustainability.

It is necessary to acknowledge the limitations and challenges in this journey. The fluid nature of truth, especially in the context of sustainability, requires an AI system that is robust and adaptable to the evolving landscape of knowledge and perspectives. Despite these challenges, the potential of AI in transforming the approach to sustainability is immense, in terms of the three dimensions.. Through this exploration, the contribution to a future where decisions are made with a deeper and more accurate understanding of the assumptions they rest upon is significant.

2 Foundation

Regarding making informed choices, especially on sustainability, it is important to appreciate the implications of assumptions. Many policies, strategies, and actions are based on assumptions. Nevertheless, if left uncriticized, such assumptions result in biased views of reality and faulty judgments. Therefore, before discussing assumption identification through artificial intelligence, it must be clear that the concept of assumption itself is indispensable for any decision process [4].

An assumption denotes a statement or idea taken without its supporting data or facts. They are not usually explicit but lurk in the substructure of our reasoning. For instance, where a policy arises due to the belief that renewable energy systems are always environmentally friendly, it might overlook complications of solar panel and wind turbine production costs to the environment. While such assumptions help simplify more complicated scenarios, they could sometimes be oversimplified or deceptive. Assumptions, however, have a vast influence. They determine how problems are framed, how solutions to a given problem are considered, and how the resources that would be needed are allocated. Nevertheless, assumptions are dynamic. This emphasizes a requirement of some tool to assess and reassess these underlying assumptions [4].

This is where the concept of Ground Truth comes in handy. Regarding AI and Sustainability, Ground Truth is a collection of authoritative facts, information, and evidence. This, therefore, offers a standard used to measure the correctness and relativity of the assumptions. Ground truth construction is a highly delicate procedure, which implies choosing reliable, impartial, and representative sources of existing knowledge. This Ground Truth comprises peer-reviewed scientific journals, official statistics by respected societies, and reports by credible research institutes. However, the process involved in picking Ground Truth sources also has its disadvantages. Considering the possible bias of any statistics and publications requires much attention. Additionally, “reliable source” has a specific meaning in some fields depending on the changes occurring within and among these fields. In the case of constantly changing knowledge, it creates an extra challenge in pinpointing the static Ground Truth.

Hence, the AI system that identifies and evaluates assumptions should be flexible to adjust to the changing data scene.

It will be necessary to relate the assumption with Ground truth since the connection of this pair will help answer specific questions. An Assumption presents a starting point. It is also the basis of understanding and action, but ground truth ensures checks and balances. It makes sure that the decisions are more factual, not based on assumptions. This is the premise on which an intelligent yet sensible AI system relies. Understanding the concept of Assumption and Ground Truth and achieving resilience are key areas of concern for developing an effective AI that can navigate the precarious ground of sustainability. In order to proceed further, AI must be able to discern, inquire about, and verify its assumptions under strict Ground Truth criteria.

3 Assumptions

A systematic method is essential in the critical evaluation process of assumptions to determine an assertion's validity. In order to critically examine assumptions, a thorough analysis is conducted in four different categories, each of which plays a vital role. The classifications used to evaluate assumptions are source/context, person/organization, content, and justification. Combining these categories creates a hardened framework that directs a methodical investigation of assumptions and helps one grasp the subtle aspects that support their validity. When assumptions are evaluated systematically, it becomes a comprehensive and organized process that promotes openness and clarity when determining the truthfulness of assumptions. For example, when we consider the statement made by Donald Trump, "Our air right now is cleaner than it has ever been for our citizens" [2]. We can evaluate this statement by analyzing each category to identify the truth of the assumption.

3.1 Identification

3.1.1 Source/Context

Examining a statement's source and context is part of this category. It is assumed that the information's dependability is greatly influenced by the source of the statement and the context of the assumption, whether the person was cited correctly. When we look at the example mentioned above, the statement used within this report was taken from the blog post "Donald Trump: stupid things he said about the Planet" from the Friends of the Earth website [2]. Since the headline indicates a bias, it is essential to mention that there is a possibility that

he was not cited correctly and / or that his original statement was taken out of context. When looking at his interview [3], it is essential to note that he failed to specify whether he was referring to air quality, making the assumption less reliable due to the lack of context. The absence of specificity creates ambiguity, as "cleanest" can be interpreted in various ways. Without a clear context, the audience is left to make assumptions about what the speaker means by "cleanest", leading to potential misunderstandings.

3.1.2 Person/Organization

This category focuses on who made the assumption. It is important to consider if the person is trustworthy and knowledgeable in the relevant field. In this context, the statement mentioned is attributed to a former US president whose credibility is partially grounded on the assumption that he has a team of experts to support him. However, it is essential to emphasize that the trustworthiness of his statements, but also that the correct citation from the website is intricately tied to ideological perspectives. People who share the same ideology as Trump are more likely to view his statements as credible, whereas those who do not align with his views may be more inclined to question the accuracy of his statements. This underscores the role of personal beliefs and perspectives in shaping credibility assessment.

3.1.3 Content

In analyzing a statement, we must also focus on the specific wording and punctuation used. Considering the statement "Our air right now is cleaner than ever for our citizens". While particular words like "is" may not add meaning, words like "cleaner" or "our citizens" carry weight, prompting essential questions. For example, when it says "cleaner", we must ask what "cleaner" means. Similarly, the term "our citizens" raises questions about which group of people is referred to. This meticulous examination seeks to unveil the intended meaning behind these terms. By examining the used language, we can better understand the intended meaning of the statement and uncover any potential ambiguities that may affect its interpretations.

3.1.4 Justification

This category focuses on examining how statements can be proven with data. To justify an assumption , evaluating the facts or evidence that backs it up is essential. It is assumed that observable or verifiable knowledge should be the foundation for any well-founded assertion. This may include empirical data, research findings, statistical analyses, or any evidence that adds credibility to the statement.

In order to support our example assumption, one could refer to the Air Trends Report of 2022 from the Environmental Protection Agency (EPA) [1]. This report is a source of evidence or data to assess the statement's validity. The EPA's Air Trends Report is an authoritative source that tracks changes in air quality across the United States over time. The report includes data on various pollutants, and by analyzing trends in the data, the report can provide insights into whether the air quality is improving, deteriorating, or remaining constant over time. However, it is essential to note that the data only goes back to 1990. So, we cannot say whether the concentrations were higher or lower before that time.

3.2 Using Artificial Intelligence in Identifying Assumptions

The global focus on sustainability will likely increase in the coming years as individuals, businesses, and governments recognize the importance of addressing environmental, social, and economic challenges. Our project aims to help people make better decisions, thus resulting in better sustainable practices [6].

We want to leverage emerging technologies such as artificial intelligence, machine learning, and data analytics to enhance the accuracy and efficiency of validating assumptions. These technologies can provide deeper insights into complex sustainability issues. As more data becomes available, projects like “Sustainability Truth” may have the opportunity to play a crucial role in providing evidence-based insights. Data-driven decision-making is becoming increasingly essential in sustainability, allowing stakeholders to make informed decisions.

4 Limitations

The biggest problem with using Artificial Intelligence to detect assumptions in any context is that it is challenging to determine what is true. The above challenge lies at the heart of what AI attempts to accomplish by comparing assumptions with the already explained concept of ‘Ground Truth’. Nevertheless, it becomes difficult to define what contributes to the Ground truth, considering that the concept of truth itself is changeable and relative. In other words, because of its subjective nature, the truth affects what assumptions can be identified by the AI. Regarding sustainability, perceptions of truth differ drastically depending on cultural and spatial conditions. This could be true since an assumption held valid in a certain area can be disputed within another. Therefore, this implies that the AI has to work in an environment composed of mixed elements consisting of facts interconnected with cultures and individual opinions, making it a challenging exercise to establish uniformly recognized truth.

Moreover, a challenge for sustainability lies in the changing nature of science. New knowledge changes previously known truths; hence, every piece of Ground Truth should be continuously updated. This is key to the AI's capability to expose assumptions as more truthful or more falsey [5].

Building an authentic Ground Truth is further complicated by the availability of misinformation and biased information sources. Hence, the AI system should contain advanced algorithms that can distinguish between reliable and skewed stories to ensure that assumptions are made up of truthful and unaffected statistics. Moreover, the different dimensions of sustainability encompassing multifarious techniques and perspectives also compound this issue. The AI must be adaptable enough to recognize assumptions that may cut across different sustainability aspects [5].

Briefly stated, the task of defining truth is a step towards the determination of assumptions in sustainability but needs help. These include the truth as a matter of opinion or subjectivity, the changeable nature of science, widespread myths and misunderstandings, and complex demands for integrating approaches (interdisciplinarity). These parameters are important when designing an AI-based machine that efficiently contrasts assumptions with an elaborate and fluid Ground Truth.

5 Future Outlook

The future landscape of AI in identifying and validating Assumptions in the context of sustainability is set to be transformative, blending cutting-edge advancements with critical challenges. Key to this evolution will be the enhancement of Natural Language Processing, which will significantly refine AI's ability to interpret the subtleties and nuances in text, thereby more accurately pinpointing underlying assumptions. Complementing this, integrating AI with big data analytics will be a game-changer, enabling the analysis of various information sources, from scholarly research to digital media footprints. This integration will provide a comprehensive view of emerging trends and contradictions within the sustainability discourse.

Crucial to the ongoing relevance of AI in this field will be its adoption of continuous learning models, allowing it to perpetually update and recalibrate its knowledge base in response to new scientific discoveries and perspectives on sustainability. This adaptability will be enhanced through a cross-disciplinary approach, as AI incorporates insights from diverse fields connected to sustainability, thereby ensuring a holistic analysis of assumptions.

The practical application of AI will see a significant shift towards more dynamic approaches, particularly in scenario modeling and real-time decision support. These applications will enable decision-makers to simulate various sustainability strategies under different assumptions and promptly integrate new data for timely decision-making insights. Advancing AI in evaluating sustainability assumptions presents both ethical and practical challenges. Crucially, eliminating biases in AI algorithms is fundamental, particularly those affecting sustainability assessments. Ensuring transparency in AI's data processing is critical to building trust and acceptance. Equally important is accountability regarding AI's impact on sustainability decisions. A holistic approach to AI development in sustainability necessitates collaboration among experts from science, policy, industry, and activism. Additionally, fostering open-source, community-driven AI projects will enhance our toolkit, keeping it pertinent and practical in the dynamic field of sustainability.

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